October 14, 1939

THE LANCET

Offices: 7, Adam Street, Adelphi, W.C.2.

Telegrams: Lancet, Rand, London. Telephone: Temple Bar 7228 and 7229.

No. XVI., of Vol. II., 1939. LONDON, SATURDAY, OCTOBER 14, 1939. Pp. 96—Price 1s.
No. 6059. Vol. CCXXXVII. Founded 1823. Published Weekly. Registered as a Newspaper. Annual Subscription: Inland £2 2s. Abroad £2 10s.

OXFORD MEDICAL PUBLICATIONS

See Page 2

TREATMENT OF WAR WOUNDS AND FRACTURES.
By J. TRUETA, M.D.,
Late Director of the Department of Surgery, General Hospital of Catalonia, Barcelona.
Pp. xiii + 143. 48 Illustrations. 8s. 6d. net.
A manual for every practitioner who may be called upon to treat the casualties of war. Leading articles in the *Lancet* and *British Medical Journal* draw particular attention to the simplicity and extraordinary effectiveness of the methods described.
Hamish Hamilton Medical Books, 90, Great Russell-st., W.C.1.

Second Edition. Pp. 190 + viii. 6s. net. Recently Published.
PRINCIPLES OF MEDICAL STATISTICS
By A. BRADFORD HILL, D.Sc., Ph.D.
The Lancet Limited, 7, Adam-street, Adelphi, London, W.C.2.

New Edition. Pp. 340. 8s. 6d. + post 6d.
VITAL CARDIOLOGY
By BRUCE WILLIAMSON, M.D., F.R.C.P.
A new outlook on treatment.
E. & S. Livingstone, 16 & 17, Teviot Place, Edinburgh, 1.

RADIOTHERAPY IN THE DISEASES OF WOMEN
By Malcolm Donaldson, B.A. (Cantab.), F.R.C.S. (Eng.), M.B., Ch.B. (Cantab.)
Physician Accoucheur with Charge of Out-patients, St. Bartholomew's Hospital; Consulting Gynæcologist, Royal Northern Hospital, &c.
Demy 8vo. 148 pages. 11 Illustrations in the Text: 2 Plates, one in Colour. Price 7s. 6d. net; postage 6d.
Hodder & Stoughton Ltd., 20, Warwick-square, E.C.4.

URINARY SURGERY.
A Handbook for the General Practitioner.
By W. K. IRWIN, M.D., F.R.C.S.
Surgeon, St. Paul's Hospital for Genito-Urinary Diseases.
"Clearly written...furnishes the practitioner with information of great practical value in his everyday work."—Brit. Med. Jour.
Second Edition. Revised and Enlarged.
Price 10s. 6d. (postage 6d.)
Baillière, Tindall & Cox, 7 & 8, Henrietta-street, London, W.C.2.

In Two Volumes. SELECTED WRITINGS OF
JOHN HUGHLINGS JACKSON,
M.D., F.R.C.P., F.R.S.
I.—Epilepsy and Epileptiform Convulsions.
II.—Evolution and Dissolution of the Nervous System: Speech: Various Papers: Addresses and Lectures.
Edited by JAMES TAYLOR, M.D., F.R.C.P.
With the advice and assistance of GORDON HOLMES, M.D., F.R.C.P., and F. M. R. WALSHE, M.D., F.R.C.P.
Over 500 pages in each vol. Price 25s. net each; postage extra (inland 9d., abroad 10d.).
Hodder & Stoughton Ltd., 20, Warwick-square, E.C.4.

DISEASES OF THE THYROID GLAND.
With Special Reference to Thyrotoxicosis.
By CECIL A. JOLL, M.S., B.Sc., F.R.C.S. (Eng.).
Crown 4to. Fully Illustrated. £3 3s. net.
"No praise is too high for the author of this great book. It must be considered as the standard work on thyroid disease. Its pages summarise all that is known of this most interesting subject at the present day."—West London Medical Journal.
William Heinemann (Medical Books) Ltd., 99, Great Russell-street, London, W.C.1.

SAUNDERS'
TEXTBOOKS FOR STUDENTS
SOME NEW AND RECENT EDITIONS

See Advertising Page 3

PROBLEMS OF
ANÆSTHESIA
IN GENERAL PRACTICE
By D. H. LUKIS, M.D., B.S. Lond.
Late Hon. Anæsthetist, South London Hospital; late Clinical Assistant, Ear, Nose, and Throat Department, Queen's Hospital for Children; Hon. Medical Officer, Kingston Victoria Hospital.
Demy 8vo. 7s. 6d. net (postage extra). 158 + vi pages.
Hodder & Stoughton Ltd., 20, Warwick-square, E.C.4.

Free to the Medical Profession on request. Cloth bound Ed. 5s.
ARTIFICIAL LIMBS.
"SOLVITUR AMBULANDO."
A Symposium on Prosthetic Achievement.
Pp. 72. 37 Coloured Plates.
"I congratulate you on this interesting, instructive, and artistic production. I consider it to be a very great addition to my library."—M.B., Ch.B., F.R.C.S.
J. E. Hanger & Co., Ltd., 7, Roehampton House, Roehampton, S.W.15.

SECOND EDITION.
DISEASES OF THE RECTUM AND COLON
AND THEIR SURGICAL TREATMENT.
BY
J. P. LOCKHART-MUMMERY
F.R.C.S. ENG., M.A., M.B., B.C. CANTAB.
Emeritus Surgeon to St. Mark's Hospital.
Pp. viii + 616, with 247 Illustrations. Price 35s.
Baillière, Tindall & Cox, 7 & 8, Henrietta-street, London, W.C.2.

THE CLINICAL INTERPRETATION OF AIDS TO DIAGNOSIS.
Vols. I and II. Price 10s. 6d. each. Postage extra.
Volume I.—"Each of the 45 Sections included in the book is contributed by an experienced worker. . . ."
Volume II.—"We may say that the success of the first volume is here repeated. . . ."—British Medical Journal.
"Physicians and surgeons cannot afford to omit the knowledge here outlined. . . ."—Birmingham Medical Review.
The Lancet Limited, 7, Adam-street, Adelphi, London, W.C.2.

THREE NEW EDITIONS

HALE-WHITE'S MATERIA MEDICA
Revised by
A. H. DOUTHWAITE, M.D., F.R.C.P.,
Physician, Guy's Hospital.
NEW (24th) EDITION. 12s. 6d.
The most important additions to this new issue are the Sulphonamides, the Œstrogens, Corpus Luteum Hormone, the Androgens, Heparin, Nicotinic Acid, Tetrachlorethylene, the stable derivatives of Choline, and Cyclopropane.

RECENT ADVANCES IN ANÆSTHESIA AND ANALGESIA
By C. LANGTON HEWER,
M.B., B.S., D.A. (R.C.P. & S.),
Anæsthetist and Demonstrator of Anæsthetics, St. Bartholomew's Hospital.
NEW (THIRD) EDITION.
132 Illustrations. 15s.
The importance of Anæsthesia in war-time can hardly be over-estimated. Full information is given of all the latest methods.

DISORDERS OF THE BLOOD
By L. E. H. WHITBY, *C.V.O., M.C.*, M.D., F.R.C.P., D.P.H., and
C. J. C. BRITTON, M.D., D.P.H.,
Assistant Pathologists, The Bland-Sutton Institute of Pathology, The Middlesex Hospital.
NEW (THIRD) EDITION.
12 Plates (8 Coloured) and 61 Text-figures.
21s.
The revision has necessitated the addition of 18 pages to the text and a number of new illustrations. It has been brought thoroughly up to date, and important new matter has been included.

J. & A. CHURCHILL LTD., 104 Gloucester Place, LONDON W.1

LIBRARY NOV 17 1939 PERIODICAL DIVISION

Valentine's Meat-Juice

In **Hospital** and **Private Practice** and **in their own persons** when ill, **Physicians** have **demonstrated** the **power** of **Valentine's Meat-Juice** to **Sustain** and **Strengthen** the weakened **Vital Forces** when the **Digestive Organs** are **Impaired.**

Debility, Exhaustion and Anæmia

Ross H. Skillern, M.D., *Laryngologist, Rush Hospital for Consumption, Philadelphia, Pa.*: "I, myself, had the misfortune to be seized with an attack of Cerebro-spinal Meningitis and after a critical illness recovered. My mainstay during the attack was VALENTINE'S MEAT-JUICE, and I can assure it materially aided in my recovery."

For Sale by European and American Chemists and Druggists

VALENTINE'S MEAT-JUICE COMPANY

A-34 **RICHMOND, VIRGINIA, U.S.A.**

"Particularly suitable for young and sensitive skins."

Wright's Coal Tar Soap has been famous as a nursery and toilet soap for generations. Its valuable antiseptic and antipruritic constituents and creamy emollients make it particularly suitable for young and sensitive skins—soothing, refreshing and definitely protective to health. Wright's is the *only* toilet soap to hold the Blue Seal of Merit —the highest award of the Royal Institute of Public Health & Hygiene. You can have every confidence in recommending this safe soap to your patients for their children.

★ **WRIGHT'S** *COAL TAR SOAP* ★ *6d. and 10d.*

OCTOBER 14, 1939

THE LANCET

A JOURNAL OF BRITISH AND FOREIGN MEDICINE, SURGERY, OBSTETRICS, PHYSIOLOGY, CHEMISTRY, PHARMACOLOGY, PUBLIC HEALTH, AND NEWS

No. 6059 LONDON: SATURDAY, OCTOBER 14, 1939 CCXXXVII

CONTENTS

THE WHOLE OF THE LITERARY MATTER IN THE LANCET IS COPYRIGHT

ADDRESSES AND ORIGINAL ARTICLES

Bacteriology of Rheumatic Fever. By W. R. F. COLLIS, F.R.C.P. 817

Testosterone Propionate in Chronic Mastitis. By A. W. SPENCE, F.R.C.P. 820

Dissemination of Infection in School Dormitories. By F. G. HOBSON, F.R.C.P. (*illus.*) 823

Stomatitis of Dietary Origin. By W. R. AYKROYD, M.D., B. G. KRISHNAN, and Capt. R. PASSMORE, B.M. 825

Effect of Prolactin on Lactation in Nursing Women. By MEAVE KENNY, M.R.C.S., and EARL KING, Ph.D. With notes by N. EVERS, B.Sc., and W. J. HURRAN, B.Sc. (*illus.*) 828

Blood-grouping Technique with Test for Syphilis. By A. H. WALTERS (*illus.*) 831

CLINICAL NOTES

Estimation of Sulfapyridine (M. & B. 693). By H. H. VAN DER ZOO DE JONG, Ph.D. 833

Arcus Lipoides of the Ear-drum. By J. BERBERICH, M.D. 833

REVIEWS AND NOTICES OF BOOKS

Cæsarean Section, Lower Segment Operation. By C. McIntosh Marshall, F.R.C.S. 835

Über die integrative Natur der normalen Harnbildung. By Gösta Ekehorn, D.M. 835

Transactions of the American Association of Genito-Urinary Surgeons 835

The Needs of Youth. By A. E. Morgan, M.A. 836

LEADING ARTICLES

AMPUTATIONS 837

RESPIRATION IN UTERO ... 838

RADIUM 838

RETIREMENT OF A PUBLIC SERVANT 839

ANNOTATIONS

Plasma Transfusion 840

Sulphanilamide in Scarlet Fever 840

Pasteur 840

The Feeding of Infants 841

Air-embolism via the Vagina 842

Carbon-monoxide or Food-poisoning? 842

Parathyroid Glands and Renal Disease 842

Absorption and Excretion of Iron. 843

Students Grouse 843

Aspirin Hæmatemesis 843

THE NEW ENDOCRINOLOGY

II—Chemistry of the Sterols. By Prof. E. C. DODDS, F.R.C.P. (*illus.*) 844

SPECIAL ARTICLES

Medicine and the Law: Operation at Public-health Hospital 845

Health of the Regular Army 846

Scotland: Sir James Leishman—Payment to Hospitals for War Casualties—Chairman of Glasgow Royal Infirmary 846

Norway: Getting up Soon after Laparotomy—Pneumonia from Manganese in Smoke 847

.... In England—Now 850

The LANCET 100 Years Ago 855

OBITUARY

Harvey Cushing, M.D., F.R.S. (*with portrait*) 856

John Dixon Comrie, F.R.C.P.E. (*with portrait*) 859

Charles Cotton, F.R.C.P.E. 859

GRAINS AND SCRUPLES

From a Poitrinaire—II 848

PUBLIC HEALTH

Fever Beds in London—Water Sterilisation in the Field—Horse-drawn Vehicles and Summer Diarrhœa 849

Infectious Disease in England and Wales 850

LETTERS TO THE EDITOR

The Ulcer Patient (Sir Arthur Hurst, F.R.C.P.). 852

The Psychological Factor in Hæmatemesis (Dr. Denys Jennings) 853

Position of Medical Students (Mr. Norman C. B. Trapps) 854

Evans' Recent Advances in Physiology (Dr. W. H. Newton) 854

Freud and Sex (Mr. A. Rugg-Gunn, F.R.C.S.) .. 854

Aerial Disinfection (Dr. C. C. Twort) 854

Chemotherapy of Broncho-pneumonia (Dr. B. A. Peters) 855

Evacuees as Research Material (Dr. W. Lindesay Neustatter) 855

Medical Libraries (Mr. J. Dudley Robinson) 855

NEW INVENTIONS

A Frame-and-hurdle Bed-rest. By TERENCE EAST, F.R.C.P. (*illus.*) 836

PARLIAMENTARY INTELLIGENCE

On the Floor of the House 860

From the Press Gallery: Sugar 860

Question Time: Students and Military Service—Medical Press and Ministry of Information—Price of Drugs—Cost of Evacuation—Inspection of Evacuees—Release of Full-time Members of E.M.S.—Doctors at First-aid Posts 861

MEDICAL NEWS

University of Cambridge .. 862

Medical Aid for Children in Reception Areas 831

St. Andrews University ... 862

Royal Faculty of Physicians and Surgeons of Glasgow 862

Medical Society of Individual Psychology 862

British Institute of Radiology 862

Tavistock Clinic 862

West End Hospital for Nervous Diseases 862

NOTICES

Bombs and Radium 863

Leptospirosis 863

Psychology for Young People 863

Spanish Psychological Studies 863

War Uniforms for Nurses.. 864

Rabbits in War-time..... 864

Double-decker Hand Ambulance 864

Alcoholism in Boston, Mass. 864

Carbon Dioxide as a Vasodilator 864

A Self-adhesive Bandage.. 834

Medical Diary 859

Vacancies, Births, Marriages and Deaths..... 862

Appointments 862

Two New Cassell Books

RECTAL SURGERY

By **W. ERNEST MILES**, F.R.C.S. Eng., F.R.C.S.I. (Hon.), F.A.C.S. (Hon).

A practical guide to modern operative methods of treatment by a leader in the field of operative Surgery. Authoritative and comprehensive.

Demy 8vo, 360 pages. With 2 Colour Plates and 105 Text-figures. **17s. 6d.** net.

THE DYSENTERIC DISORDERS

By **PHILIP MANSON-BAHR**, C.M.G., D.S.O., M.D., D.T.M. & H. Cantab., F.R.C.P. Lond.

A practical manual on the diagnosis and treatment of Dysentery, Sprue, Colitis, and the other Diarrhœas in general practice. "A very valuable book . . . because of its essentially practical and personal character is bound to make a wide appeal."—*British Medical Journal.*

Medium 8vo, 620 pages. With 23 Plates, 9 in Colour, 106 Text-figures and 14 Charts. **25s.** net.

CASSELL & COMPANY LIMITED, La Belle Sauvage, London, E.C.4

OXFORD MEDICAL PUBLICATIONS

Just Published

BLOOD TRANSFUSION

By **VICTOR HORSLEY RIDDELL**, M.D., F.R.C.S.

Assistant Surgeon and Lecturer in Operative Surgery, St. George's Hospital, London; Assistant Surgeon, Royal Waterloo Hospital, London; Consultant, British Red Cross Transfusion Service.

Contents include :—The Donor—The Recipient—Typing Sera—Blood-grouping Technique—The Direct Compatibility Test—The Universal Donor—The Physiology of the Blood Groups—Complications of Blood Transfusion—Principles of Dosage—Contra-indications—Indications—Relative Therapeutic Values of Whole Blood and Citrated Blood—The Anticoagulants—Transfusion of Whole Blood—Transfusion of Citrated Blood—Apparatus—Transfusions of Large Volume—Transfusion in Infants—Auto-transfusion—Stored Blood—Selection of Donors for Enrolment in a Transfusion Service—The "Voluntary" or "British" System of Recruiting Donors compared with the Professional System—The Organisation of a Transfusion Service—Index.

Pp. 384 65 Illustrations (9 in Colour) **21s.** net.

THOMSON and MILES'

MANUAL OF SURGERY (9th Edition)

By **ALEXANDER MILES**, M.D., LL.D., F.R.C.S.(Ed.)

Consulting Surgeon, Royal Infirmary, Edinburgh

and the late **Sir DAVID WILKIE**, with the assistance of twenty-eight coadjutors

This edition has been entirely revised and appears in a new format—two demy 8vo ($8\frac{3}{4}'' \times 5\frac{1}{2}''$) volumes replacing the original 3-vol. crown 8vo issue.

VOL. 1:	General Surgery	Pp. 700	343 Illustrations	**21s.** net
VOL. 2:	Regional Surgery	Pp. 758	299 Illustrations	**21s.** net

MEDICAL PRACTICE IN RESIDENTIAL SCHOOLS

By **F. G. HOBSON**, D.M., F.R.C.P.

"A book which no school medical officer should be without."—BRITISH JOURNAL OF CHILDREN'S DISEASES.

Pp. 300 8 Illustrations 3 Coloured Plates **10s. 6d.** net

HEART DISEASE AND PREGNANCY

By **CRIGHTON BRAMWELL**, M.D., F.R.C.P., and **E. A. LONGSON**, M.B., Ch.B., D.P.H.

"Of inestimable value alike to the general practitioner, obstetrician and cardiologist."—JOURNAL OF OBSTETRICS AND GYNÆCOLOGY.

Pp. 206 57 Illustrations **8s. 6d.** net

TEXT-BOOK OF NUTRITION

By **J. A. NIXON**, C.M.G., M.D., F.R.C.P., and **D. G. C. NIXON**, M.B., B.S.

"Fills a long-felt want . . . gives the general practitioner all the information he requires."—MEDICAL PRESS AND CIRCULAR.

Pp. 230 9 Figures **7s. 6d.** net

Oxford University Press

ADDRESSES AND ORIGINAL ARTICLES

BACTERIOLOGY OF RHEUMATIC FEVER

By W. R. F. Collis, M.D. Camb., F.R.C.P., F.R.C.P.I., D.P.H.

PHYSICIAN TO THE NATIONAL CHILDREN'S HOSPITAL AND PÆDIATRICIAN TO THE ROTUNDA HOSPITAL, DUBLIN

A study of the bacteriological investigations into the cause of rheumatic fever during the last fifty years is interesting from many points of view. It is even slightly humorous sometimes, if one is permitted to regard such a subject ironically. Every worker who has studied the manifestations of the rheumatic fever has come to the conclusion that it must be caused by a demonstrable germ, fulfilling Koch's postulates. I propose here to review the literature of the more reliable of these workers and to add the results of some experiments of my own, the importance of which has only recently become apparent.

BACTERIOLOGICAL RETROSPECT

Before the beginning of the century Wassermann and his co-workers (1899) had found an organism in a blood-culture from a patient suffering from rheumatic fever, but they could not repeat their work, nor could anybody confirm it. Then Poynton and Paine (1900, 1913) entered the field. They isolated a diplococcus in blood and other cultures, injected it into animals and produced carditis and arthritis. They claimed that they had found the specific germ of the disease. Careful study of their pathological material and control experiments, however, showed that though they had produced carditis and arthritis, it was not rheumatic but infective. Although its central hypothesis was disproved, their work was extremely important in that they studied the disease minutely, and many of their observations were invaluable to those who came after. Most important of all was their observation that acute streptococcal pharyngitis almost always preceded an attack of rheumatic fever. The war years put an end to this work and when in 1920 investigators were again in a position to take up the subject, Paine was dead, the diplococcus lost and Poynton unwilling to start all over again. Hence the diplococcus of Poynton and Paine has never been examined and classified by the new methods now in use and we shall never know definitely what sort of streptococcus it was, though the general impression is that it belonged to the viridans group.

The post-war workers went back to the old method of blood-culture with modifications. Bertrand (1926), for instance, in Antwerp, by anaerobic culture of a large number of bloods in his very unusual laboratory, isolated a strange gram-positive bacillus which he claimed would change into a streptococcus if treated in the right way. (Later, following his directions on a culture he sent me, I found that it certainly broke up into coccoid forms but that it required more imagination than I possessed to call it a streptococcus.) He claimed that his organism was the same as that formerly called Achalme's bacillus but suggested that a better name would be "the diplostreptobacillus of rheumatism." He said it was similar to the *Bacillus welchii*, but did not state why. However, in some way one of his co-workers obtained a troup of Voronoff's castrated anthropoid apes, whose glands had already been used to rejuvenate the failing functions of elderly epicures, and injected them with the organism. Later he photographed these most unhappy creatures to demonstrate the crippling arthritis he had produced and proclaimed that *he* had found the causative organism of acute rheumatism. Undeterred by the scepticism of his colleagues he produced a vaccine which has been used most successfully in the Low Countries for all forms of rheumatism, acute and otherwise. Bertrand has had only one serious rival in Europe, Professor Löwenstein (1931, 1932) of Vienna, who claimed to be able to find tubercle bacilli in large numbers of blood-cultures from rheumatic and other conditions. He caused us a lot of trouble till Wilson, Schwabacher et al. (1933) found acid-fast bacilli inside most laboratory taps. (We supplied Schwabacher with fourteen blood-cultures from rheumatic-fever patients.)

During this period American workers were not idle. Small (1927) isolated a diplococcus from a blood-culture which he claimed was the same as Poynton's and Paine's. His work was not confirmed. He also made a vaccine. Birkhaug (1927) isolated a strange organism which he called R.F.1.B. It was somewhere between a streptococcus and a staphylococcus. It autolysed itself rapidly in broth-culture and produced a potent toxin of some kind, which gave a number of us high temperatures and pains when we injected ourselves with it to see its action.

Then came the work of Nicholls, Cecil and Stainsby (1929). They obtained non-hæmolytic streptococci in about 50 per cent. of their blood-cultures by incubating them for four to six weeks. This extraordinary claim made many workers, including myself, feel that their work must be confirmed if possible, and an enormous number of blood-cultures were carried out by Swift at the Rockefeller Institute, Coburn at the Presbyterian Hospital and myself at the Hospital for Sick Children, Great Ormond Street. Apart from the 14 sent to Schwabacher, already referred to, I did 130 blood-cultures using every imaginable technique, including Bertrand's anaerobic method. In over 70 cases the cultures were kept for over five weeks. These were subcultured in a sterile room, in a sterile cupboard behind a glass screen into which only the operator's hands protruded. The methods we employed proved satisfactory in all ordinary cases of septicæmia, such as infective endocarditis. In the rheumatic cases we grew viridans streptococci from 3 and diphtheroids from about 20, usually after at least ten days' incubation. The latter organisms were not the ordinary skin or nasal diphtheroids but grew with difficulty in minute colonies and had no effect on the sugars and appeared quite non-pathogenic. They grew from control bloods as well as those of rheumatic cases. I assumed that they were of no importance and considered my 144 blood-cultures to have proved nothing. I never wrote them up.

Then a new worker, Callow (1933), reported from Park's laboratory in New York. She did hundreds of blood-cultures by the same prolonged incubation technique. She also found these diphtheroid forms in rheumatic cases and from cases of pharyngitis and measles. She claimed that they were degenerate streptococci of different groups and could be changed back into their original forms by certain culture methods. I sent her my diphtheroid cultures and she sent them back as streptococci. Her paper was not only one of the longest, but one of the most carefully checked I have ever read. She did hundreds of animal experiments, and produced agglutinins which would agglutinate a certain streptococcus and its diphtheroid form. Non-germinating potato was

one of the essential ingredients in her culture media. I tried to confirm her work. She came to Ireland and we tried together again and again. But neither the streptococci would change into diphtheroids nor the diphtheroids into streptococci in Ireland. Perhaps it was because germination of all kinds tends to continue all the year round in Ireland and the potato proved no exception to the rule. She went away and although I kept the cultures going on her media for another year nothing happened. I gather that Swift and Coburn were no more successful than I.

More recently filter-passing viruses have been coming in for study and several observers have claimed to have isolated them. Signy and Amies, for example, obtained virus-like bodies from exudates supplied by Schlesinger (1935). But up to the present their work is conflicting and various workers have failed to confirm each other.

It must be admitted therefore that the blood-culture line of approach to the problem of rheumatic fever has proved an unhappy one for all workers. And animal experiments have proved as barren as the blood-cultures. More than twelve different types of animal have been injected with every sort of material from patients with rheumatic fever without producing the disease experimentally.

On the other hand epidemiological and immunological studies have thrown much light upon the ætiology of the disease. Glover (1930) described epidemics of tonsillitis occurring in semi-isolated communities. He showed that the peaks of these epidemics were followed after a period of two weeks by the peaks of rheumatic fever. Schlesinger (1930) confirmed and enlarged the observation made long ago by Haig-Brown (1886) that there was a silent or incubation period of ten to twenty days between the acute pharyngitis and the subsequent rheumatic fever. His charts in cases of rheumatic relapses were most convincing and his work was confirmed by Sheldon (1931). I found that the organism causing the acute pharyngitis was invariably a hæmolytic streptococcus (Collis 1931). Meanwhile Coburn (1931) working in America had published his famous work in which he brought together an enormous number of facts in support of his view that the hæmolytic streptococcus was the causal organism of rheumatic fever. The early epidemiological work of Bradley (1932) also confirmed these views. Todd (1928) and later Coburn (1935) and Bradley et al. (1939), all working separately, produced much immunological data (anti-streptolysins, precipitins, and so on) indicating the close association of the hæmolytic streptococcus and rheumatic fever. It was clear however that if the organism was the infective factor, it must be shown to be acting in a new way, different from any already known. So far there is a good deal of evidence to support the theory that the disease is caused by an antigen-antibody reaction occurring in certain people born with or acquiring the rheumatic diathesis. Many believe this view, but others still cling to the belief that a specific virus (probably filter-passing) will eventually be found. All serious students of the disease, however, now agree that certain toxigenic hæmolytic streptococci play a definite part in the disease; if they are not the sole infective agent, they must at least be regarded as the activators of the disease both in its primary attack and secondary relapse.

POST-MORTEM CULTURES

While engaged upon the blood-culture and epidemiological work mentioned above, I also studied all possible morbid material from rheumatic-fever post mortems, in all seventeen. The bacteriological findings at these post mortems were startling and appeared so contradictory and difficult to understand that I decided not to publish them till I had an opportunity of controlling them more carefully and checking them with another technique. Circumstances made it impossible for me to carry out these control experiments. Hence these records were never published. Recently, however, Green (1939) has published his findings on nine autopsies performed in the department of bacteriology at Edinburgh on patients dying in an acute or subacute phase of rheumatic fever. His work appears to have been done with meticulous care, but his findings are, to say the least, extraordinary. In eight cases out of nine he has cultured hæmolytic streptococci from the heart valves of these patients. He grew these organisms from fourteen valves which showed recent valvulitis, but from none which did not. The organism was never found in the heart-blood. In three cases, he also cultured the same organism from the pericardium. In five cases, the organism in the valves at autopsy was the same ætiological type as that obtained from the throat during life. These results are very hard to explain but are clearly of the utmost importance. I therefore feel it is my duty to all workers in the field to publish the results of my autopsies without further delay, in spite of the fact that I have not yet been able to do the control experiments planned.

Below I present the technique and a summary of the relevant autopsy findings on seventeen patients dying of acute rheumatic fever. I must mention that hundreds of sections were cut, and all cases showed typical rheumatic carditis and no evidence of ulcerative endocarditis.

TECHNIQUE

The autopsies were performed as soon as possible after death; in several however the interval was as much as 48 hours. It was necessary to do the autopsies where the patients died; consequently it was not possible to make the sterile precautions as complete as I wished. The method was as follows. The thorax was opened and immediately cultures were made from pericardial fluid and heart-blood. A searing iron was used to sterilise the surface of the pericardial sac and of the heart-muscle before a sterile glass pipette was pushed through and some fluid withdrawn. Next the pharynx was taken out, and the tonsils, if present, removed and placed on sterile glass plates and covered up. Cervical and mediastinal glands were also removed and placed on sterile plates. The whole heart was then cut out, covered with a sterile cloth and placed in a sterile bowl. All the specimens were removed to the laboratory where cultures were made using the following method: glands and tonsils were placed in spirit, flamed till their surfaces were coagulated, and cut across with a sterile scalpel; platinum loop-fuls of matter from their interior were spread on blood-agar plates and inoculated into tubes of broth. The hearts were seared with hot iron and opened with sterile instruments, the valves cut out, washed in spirit, flamed, cut up and cultured direct on blood-agar and inoculated into broth tubes.

Sixteen of the seventeen autopsies described here were performed on subjects dying in acute relapses of rheumatic fever. Some had only been acutely ill a matter of weeks, others for one to six months. In many, acute hæmorrhagic pericarditis was found, and in most recent endocarditis and valvulitis. In only one could it be said that the child died simply from heart-failure due to gradual decompensation.

RESULTS

If the table is studied it will be seen that hæmolytic streptococci were found in (*a*) 14 out of 15 tonsils

RESULTS OF POST-MORTEM CULTURES FROM CHILDREN DYING OF ACUTE RHEUMATIC CARDITIS

Case no.	Heart-blood	Pericardial fluid	Splenic pulp	Tonsils	Glands			Valves			
					Cervical	Ant. mediastinal	Post. mediastinal	Mitral	Tricuspid	Aortic	Pulmonary
1	Sterile	Sterile	Sterile	Staph.	Sterile	Sterile	Sterile	Sterile	Sterile	Sterile	Sterile
2	Sterile	Sterile	Sterile	H.S. + V.S. + Staph. +	..	Sterile	Sterile	H.S. + *B. coli* +	Sterile	..	..
3	Sterile	Sterile	Sterile	H.S. + + V.S. + Pneum.	V.S. + Staph.	..	..	Sterile	Sterile	..	..
4	Sterile	V.S. +	Sterile	H.S. + +	..	..	H.S. + +	H.S. + + +	1 col. H.S.	..	H.S. + + +
5	V.S. + +	V.S. +	H.S. + + V.S. +	H.S. + +	..	..	..	..	H.S. + + V.S. +	H.S. + V.S. +	..
6	Sterile	..	..	H.S. + +	H.S. +	H.S. +	H.S. +	H.S. + +	H.S. + V.S. +	H.S. +	..
7	Sterile	Sterile	Sterile	H.S. + + V.S. +	V.S. +	..	..	V.S. +	V.S. +	V.S. +	..
8	Sterile	Sterile	Sterile	H.S. + +	Sterile	..	..	Sterile	Sterile	Sterile	..
9	Sterile	..	Sterile	H.S. +	..	..	..	H.S. +	Sterile	..	..
10	Sterile	Sterile	..	H.S. + +	..	..	..	Staph. +	Staph. +	H.S. + Staph. +	..
11	Sterile	Sterile	Sterile	..	..	Sterile	Sterile	H.S. + +	Sterile	H.S. + +	..
12	V.S. +	H.S. + V.S. +	Sterile	..	Contaminated	..	..	..	G.S. +	..	..
13	Sterile	Sterile	Sterile	H.S. + + +	..	H.S. + + +	H.S. + + +	Sterile	..	..	..
14	V.S. + + +	V.S. + + +	V.S. + +	H.S. + +	H.S. +	H.S. + +	V.S. +	H.S. + V.S. +	H.S. + V.S. +	H.S. + V.S. +	..
15	Sterile	Sterile	Sterile	H.S. + + +	..	H.S. + + Staph. +	..	H.S. + + V.S. +	..	..	..
16	Sterile	Sterile	Sterile	H.S. + Staph. +	..	H.S. + +	H.S. + +	H.S. + +	H.S. + +	..	..
17	Sterile	V.S. +	Sterile	H.S. +	H.S. + + +	Sterile	H.S. + +	H.S. 1 col.	H.S. + +	..	H.S. + Staph. +

Staph. = Staphylococci Pneum. = Pneumococci H.S. = Hæmolytic streptococci V.S. = Viridans streptococci
G.S. = Gamma streptococci

Remarks

Case 1—Child died within ten days of severe relapse acute hæmorrhagic pericarditis; little or no endocarditis.

Case 3—Acute pericarditis, myocarditis, and Aschoff reaction; acute recent valvulitis.

Case 4—Death after acute rheumatic relapse. Culture from subcutaneous nodule on elbow grew one colony H.S.

Case 5—Death after acute rheumatic relapse, following acute H.S. tonsillitis; acute general pancarditis.

Case 6—Recent acute rheumatic relapse; pancarditis; pericardial space obliterated; recent acute valvulitis.

Case 7—Fatal relapse followed acute H.S. tonsillitis; acute pancarditis.

Case 9—Relapse following H.S. tonsillitis; acute rheumatic pancarditis.

Case 10—Acute pancarditis; pericarditis very marked; recent valvulitis.

Case 11—Acute pancarditis following H.S. pharyngitis; recent valvulitis.

Case 12—Recent pancarditis; recent pericarditis and valvulitis.

Case 13—Pericarditis; no recent valvulitis.

Case 14—Acute rheumatic relapse following H.S. tonsillitis; pancarditis; very recent valvulitis.

Case 15—Pericarditis; recent rheumatic valvulitis. Gram + cocci seen in section of valve. Lung puncture H.S. + +.

Case 16—Heart-failure following pancarditis.

Case 17—Acute pancarditis; pericarditis: recent valvulitis. Section of tricuspid valve showed chain of four gram + cocci. Lung puncture H.S. + +.

(bilateral) in spite of the fact that throat cultures had become negative in almost every case before the child died; (*b*) 13 out of 27 cervical and mediastinal glands; (*c*) 22 out of 42 valves; (*d*) 2 lung punctures, 1 splenic puncture, 1 pericardial fluid, and 1 nodule.

Controls.—Fifteen control autopsies were performed. In most of these the tonsils had been removed during life and only in a few cases were the glands cultured. Hence no conclusions can be drawn from these. The heart-blood and the valves were cultured in all however. In only 6 was the heart-blood sterile; in the remaining 9 it contained different organisms, viridans streptococci and staphylococci prevailing. In 6 the valves were sterile; in 5 they grew the same organism and in 4 a different organism than the heart-blood; in 1 were grown two colonies of what were thought to be hæmolytic streptococci.

DISCUSSION

These results show that hæmolytic streptococci can be cultured at post mortem from widely varying sites in patients dying from acute rheumatism. They are further evidence of the close association of these organisms and acute rheumatism. The tonsil, gland and lung cultures are, I think, open to no criticism as to technique. It is difficult to see how the organism could have reached them from any outside source. Admittedly the hæmolytic streptococci may have gained admission to the spleen and pericardial fluid during the agonal state or after death, though this would seem unlikely. Even if this were so, it in no way detracts from the fact that the organism appears ubiquitous in these cases at autopsy; indeed it serves rather to emphasise this fact.

To explain the valve cultures or even to advance any theory to account for them is much more difficult.

The facts may be restated thus. From 12 valves where the heart-blood was sterile a pure growth of hæmolytic streptococci was obtained. From 5 valves where the heart-blood contained a viridans streptococcus at death, hæmolytic streptococci and viridans streptococci were cultured. From 5 valves where the heart-blood was sterile, hæmolytic streptococci and some other organism were obtained. From 4 valves (3 from one heart) where the heart-blood was sterile viridans or gamma streptococci were grown.

When these facts are considered, it will be clear why I at first withheld their publication till further controls and a better technique had been employed. A possible explanation is that during the removal of the heart blood containing hæmolytic streptococci was sucked back, thus contaminating the valves; one must remember that it had been shown that the bodies contained many foci of streptococci. I submit that this explanation is rather unlikely. It would be surprising if 22 out of 42 valves could be contaminated in this way.

Green's recent work was done entirely independently and without any knowledge of my results. He also removed the hearts before opening them and culturing the valves, and in two instances he cultured *Bacillus coli* as well as hæmolytic streptococci from valves where the heart-blood was sterile. If the *B. coli* were contaminants (and presumably they were) then the hæmolytic streptococci may have found their way on to the valves in the same manner. Can Green really have managed to contaminate 14 valves with hæmolytic streptococci and I 22? On one of my last cases I remember taking a smear from the outside of a heart about to be opened in the laboratory and obtaining from it a pure growth of hæmolytic streptococci.

It seems to me that the question can only be answered for certain by adopting a different technique. In future a great effort must be made to perform these post-mortems almost immediately after death. All the paraphernalia of the aseptic operation must be assembled—gowns, masks, gloves, sterile instruments, and so on. The heart must not be removed before the valves are cultured, but opened on the table with sterile instruments and the valves cut out and cultured then and there. At the same time, cultures must be made from the parietal and visceral layers of pericardium before and after searing, from the heart-muscle, from the heart-blood before and after the heart is opened, and from the great vessels.

Before such controls are done it is premature to speculate on the meaning of these cultures. This much can be said. Hæmolytic streptococci can be obtained from many varying sites at autopsy from patients dying from acute rheumatism, and they are not acting pyogenically. The pericarditis in the 4 cases from which hæmolytic streptococci were grown (3 of Green's and 1 of mine) appeared typically rheumatic and not infective. The glands from which I obtained pure growths of hæmolytic streptococci were not breaking down with pus formation but presented an œdematous and hæmorrhagic appearance. I must also say that on two occasions gram-positive cocci were seen in valve sections and that one colony of hæmolytic streptococci grew from a rheumatic nodule removed at autopsy.

In conclusion, I must emphasise that I am publishing these findings simply to help those who are working along similar lines, and I do so with great diffidence realising fully the possible sources of error.

SUMMARY

1. Past work on the bacteriology of rheumatic fever is reviewed critically and objectively.

2. In 17 rheumatic-fever autopsies, hæmolytic streptococci were grown from the centre of 14 out of 15 tonsils, from 13 out of 27 cervical or mediastinal glands, and from 22 out of 42 heart-valves.

3. These findings are felt to be worth publishing since Green has recently reported similar cultures from 9 rheumatic-fever autopsies.

I must thank Dr. Wilfrid Sheldon and Dr. Gray Hill especially for their help and advice, and for some of the post-mortem material which they supplied. The work was supported by a grant from the Medical Research Council.

REFERENCES

Bertrand (1926) Revue de thérapeutique, Brussels.
Birkhaug, K. E. (1927) *J. infect. Dis.* **36**, 444.
Bradley, W. H. (1932) *Quart. J. Med.* **1**, 79.
Callow, B. R. (1933) *J. infect. Dis.* **52**, 279.
Coburn, A. F. (1931) The Factor of Infection in the Rheumatic State, Baltimore.
— (1935) *Jour. exp. Med.* **62**, 129.
Collis, W. R. F. (1931) *Lancet*, **1**, 1341.
Eagles, G. H. (1939) *Quart. J. Med.* **8**, 173.
Glover, J. A. (1930) *Lancet*, **1**, 499.
Green, C. A. (1939) *Ann. rheum. Dis.* **1**, 86.
Haig-Brown, C. (1886) Tonsillitis in Adolescents, London, p. 39.
Löwenstein, E. (1931) *Med. Klinik*, **27**, 1669.
— (1932) *Ibid*, **28**, 1782.
Nicholls, E. E., Cecil, R. L., and Stainsby, W. J. (1929) *J. exp. Med.* **1**, 617.
Poynton, F. J., and Paine, A. (1900) *Lancet*, **2**, 861.
— — (1913) Researches in Rheumatism, London.
Schlesinger, B. (1930) *Arch. Dis. Childh.* **5**, 411.
— Signy, A. G., and Amies, C. R. (1935) *Lancet*, **1**, 1145.
Sheldon, W. (1931) *Lancet*, **1**, 1337.
Small, J. C. (1927) *Amer. J. med. Sci.* **173**, 101.
Todd, E. W. (1928) *Brit. J. exp. Path.* **9**, 1.
Wassermann, Westphal, and Malkoff (1899) *Berl. klin. Wschr.* **36**, 638.
Wilson, G. S., Schwabacher, H., Okell, C. C., and Wood, E. A. (1933) *Spec. Rep. Ser. med. Res. Coun., Lond.* No. 182.

TESTOSTERONE PROPIONATE IN CHRONIC MASTITIS *

BY A. W. SPENCE, M.D. Camb., F.R.C.P.

ASSISTANT PHYSICIAN TO ST. BARTHOLOMEW'S HOSPITAL, LONDON

THE cause of chronic mastitis is doubtful, but laboratory evidence suggests that the changes in the breasts may be due to the action of ovarian hormones, more especially œstrogens. Ovarian activity is inhibited by suitable doses of male hormone (Zuckerman 1937), and Desmarest and Capitain (1937) were the first to report favourable results in chronic mastitis by intramuscular injections of testosterone acetate. In 16 of 17 patients it brought about relief of mammary pain and diminution or disappearance of adenomatous nodules. Turpault (1937) and Bender (1937) have recommended testosterone propionate for the treatment of mostodynia, and Loeser (1938), using larger doses, observed the disappearance of nodules in 3 patients treated. In the present series of 24 patients with painful breasts and/or so-called chronic mastitis, 16 were treated with testosterone propionate with dramatic relief of pain in most cases; diminution of the nodules, although effected in some patients, was less striking.

METHODS OF TREATMENT

The patients were referred for treatment by my surgical colleagues; all, except one who complained only of a lump in the breast, had presented themselves because of mammary pain. Their ages ranged from 19 to 52, the majority being between 30 and 40. The pain was situated either in both breasts or in one, most commonly in the left. It was continuous in 13, and in 8 it would come on seven to ten days before the

* A more detailed discussion and full case-records will be published in *St. Bartholomew's Hospital Reports.*

menstrual periods. Half of the patients suffered from "painful breast," no abnormality being detected on clinical examination; the other half had obvious and easily palpable lumps in one or both breasts. In the majority (18 patients) the menstrual cycle was normal; in the remainder there was hypomenorrhœa, oligomenorrhœa, amenorrhœa, or menorrhagia.

Treatment with sterile olive oil.—In view of the pronounced psychological element in the genesis of mammary pain, all patients were first treated with intramuscular injections of sterile olive oil as a placebo twice a week for several weeks. In 13 patients there was a dramatic improvement in the pain, whether it was continuous or not: 5 were completely relieved, 5 greatly improved, and 3 improved. In 4 patients thus improved there was a fairly large lump in the breast. In 1 patient, originally examined fifteen days before the onset of the menstrual period, a large nodular mass in the right breast disappeared during the control period of three months. Had she been receiving testosterone, the improvement in the breast would have been ascribed to this. In several patients seen some months later there had been no recurrence of pain.

Treatment with testosterone propionate.—To 8 patients with no lumps, whose pain was completely or greatly relieved with olive oil, no further treatment was given. To 16 patients, whose breasts contained a lump or whose pain was not relieved by olive oil, intramuscular injections of testosterone propionate were given, in the main twice a week, but in some three times a week. In most patients injections three times a week were impossible, for they were unable to attend so frequently. To those with a lump in the breast or with continuous pain treatment was given continuously, but to those without lumps and with pain only during the two weeks before menstruation treatment was given only during this period.

The dose employed in most patients at first was 25 mg. twice a week. If the response to this after a few weeks was unsatisfactory, the dose was increased to 50 mg. twice a week, and later in some to 100 mg. twice or three times a week. Treatment was continued for various periods, depending on the response: in some patients with pain unassociated with nodules only a few weeks' treatment proved necessary; in others with nodules it was continued for several months; and in others it was resumed after an interval. There was thus a considerable variation in the total dosage, some patients receiving only 100 to 500 mg. and others as much as 2000 to nearly 3000 mg.

RESULTS WITH TESTOSTERONE PROPIONATE

Pain.—Of 16 patients treated 12 complained of pain; 8 of these were completely relieved, 2 improved, and 2 not improved. Some patients were completely relieved after the first few injections of 25 mg., whereas others required 50 mg. or 100 mg. twice a week. One of the two patients not improved received a total of 2000 mg. during a period of twenty weeks; during the last four weeks she was given 100 mg. twice a week, which suppressed menstruation. The other received inadequate treatment owing to increased growth of hair on the face. In 4 patients there was little or no pain after treatment had been discontinued for several months; 2 patients, in whom pain returned on cessation of treatment, were improved with further therapy.

Effect on nodules.—In 12 patients treated with testosterone propionate there were lumps in one or both breasts. Improvement was brought about in 8: in 3 of them the lumps completely disappeared, but in 2 of these spontaneous disappearance cannot be excluded (in 1 patient the lump was smaller at the end of treatment and disappeared during the subsequent two months when she was not receiving treatment). The third patient required a total dose of 2925 mg. over a period of five months to effect the disappearance of a large lump in the right breast. This amount caused prolonged amenorrhœa, atrophy of the endometrium, and hypertrophy of the clitoris. In the remaining 5 there was some reduction in the size of the nodules, but in 1 patient a large lump which appeared after cessation of treatment could not be influenced by further therapy.

In 4 patients treatment did not bring about any reduction in the size of the lumps; in fact, in 2 patients fresh lumps appeared during treatment. In 1 patient the treatment was admittedly inadequate owing to the appearance of slight growth of hair on the face and the patient's consequent refusal to continue. Of the 3 other patients 1 was given a total of 1300 mg. in doses of 100 mg. once a week, 1 a total of 2075 mg. in doses of 25 mg. and later 50 mg. twice a week, and 1 a total of 2000 mg. in doses of 25 mg., 50 mg., and later 100 mg. twice a week. These doses were sufficient to suppress menstruation in the last 2 patients.

Effect on the menstrual cycle.—Menstruation was suppressed in 7 patients: in 2 with 50 mg. twice a week, in 3 with 100 mg. twice a week, and in 2 with 100 mg. three times a week (in 1 of whom 100 mg. twice a week failed to suppress menstruation). Doses of 25 mg. and 50 mg. twice a week produced irregular responses. Doses of 25 mg. twice a week caused no change in the cycle in some patients, in others it reduced the length of the cycle, and in others it prolonged the cycle. Doses of 50 mg. twice a week suppressed menstruation or diminished the flow; in 1 patient this dose lengthened the cycle from twenty-one to twenty-eight days, and in 1 with menorrhagia it shortened the duration of flow and prolonged the interval between the periods. In other patients, however, it caused menstruation to be more profuse. It is noteworthy that in 1 patient, although 50 mg. twice a week at first caused amenorrhœa, a few months later after seven weeks' treatment with œstradiol benzoate (5 mg. intramuscularly bi-weekly) 500 mg. testosterone propionate in 50 mg. doses begun on the seventh day of the cycle did not suppress the succeeding period, which began a week early.

General effects of testosterone propionate.—In a few patients treatment appeared to have some effect on the general condition: 1 "felt better in herself," 1 "felt twice as fit," and 1 no longer felt ill before her periods. Since all patients were given a preliminary course of injections with sterile olive oil and, while receiving this, experienced no change in their general health, the psychological effect of treatment may be excluded. On the other hand, 1 patient felt depressed and "had no energy" while receiving 25 mg. twice a week, and 1 developed acne vulgaris on her face, her complexion previously having been good.

Increased growth of hair on the face, limbs, or trunk appeared in 5 patients and necessitated cessation of treatment. The total amounts of testosterone propionate given to these patients were 275 mg., 450 mg., 400 mg., 2000 mg., and 325 mg. In 2 patients the increased growth of hair disappeared on cessation of treatment, but in the remainder it has persisted until the time of writing—i.e., for several months. The doses given to 4 of these patients were relatively small, and yet in patients receiving far larger doses there was no evidence of this unpleasant complication. In 1 patient hoarseness of the voice developed, but

laryngoscopy revealed nothing abnormal; the hoarseness disappeared three weeks after treatment with testosterone was stopped.

Examinations for hypertrophy of the clitoris were not made, but in 1 patient, on whom endometrial biopsies were performed by Mr. J. Howkins during a period of amenorrhœa brought about by the treatment, considerable growth of the clitoris was observed. The endometrium showed extreme atrophy.

DISCUSSION

It is generally agreed that the term chronic mastitis is a misnomer, because the lesion is not a process of inflammation. Some observers, notably Cheatle and Cutler (1931), consider that the terms "chronic mastitis" and "chronic cystic mastitis," as commonly employed, include states which are entirely separate entities and differ from each other biologically and morphologically. Atkins (1938), however, hesitates about accepting such a division, and Keynes (1923) is of the opinion that the many lesions of the breast usually described as clinical entities are all different manifestations of the one disease, chronic mastitis. For my present purpose I follow Atkins and Keynes and consider the painful and nodular breast as one clinical entity. The solution, however, of the problem is important, for if there prove to be types of chronic mastitis of different ætiology, and if the difference in ætiology lies in different endocrine disturbances, it is obvious that all types may not respond to the same treatment.

I do not believe that a patient with a painful breast is necessarily suffering from chronic mastitis. Psychological factors play an important part in the genesis of pain in this position: reassurance will often bring about striking benefit, and a course of injections, even of an inert substance, will often produce the mental effect necessary to banish pain. This was observed in the present series even when the pain was accompanied by lumps in the breast. In view of this, the reports of observers on the relief of pain in chronic mastitis with hormone preparations are valueless without proper control. In the absence of a psychological or of a neuralgic factor, the pain in the breast is believed to be due to distension of the ducts and acini.

Testosterone propionate was used in the treatment of chronic mastitis on the assumption that the condition was an œstrogen effect and because the substance inhibits ovulation. Suppression of ovulation by androgens is considered to be due to an action on the pituitary. Satisfactory results have been reported with this preparation; but, since the doses used were 5–30 mg. at two-day intervals for a very short period, it is unlikely that such an amount has an inhibiting effect on the pituitary. There was no doubt that in the present series a dose of 25 mg. twice a week relieved mammary pain in some cases. Larger doses were required in others; but, since in some patients they were not high enough to cause amenorrhœa, I am inclined to believe that in the relief of pain the action of testosterone propionate may possibly be local rather than through inhibition of the pituitary.

I have not been greatly impressed by the effect of testosterone propionate on the nodules, although in some cases it did appear to exert some influence. The criticism may be raised that in some patients the doses were not sufficiently large, and that better results would have been obtained by persisting with a weekly dose of 200 mg. or more to produce amenorrhœa in all patients for some months. However, in 2 patients in whom menstruation was suppressed the size of the nodules was unaffected, and in 2 patients in whom the nodules were diminished amenorrhœa was not produced. The disappearance of the lump in 1 patient was striking, but the doses required to effect this (2925 mg. in five months) produced hypertrophy of the clitoris and extreme atrophy of the endometrium. The risk of such profound changes in the genital organs, especially during the reproductive period of a woman's life, does not, in my opinion, justify the administration of testosterone in large doses for a long time. The increased growth of hair in 5 of the 16 patients treated is a further demonstration that the indiscriminate use of this substance in women is to be deprecated. For this reason alone it should be administered cautiously. It is noteworthy, however, that this complication arose in younger women; it was not observed in older women receiving very much larger doses.

Desmarest and Capitain (1937) recommend that large nodules be punctured and the fluid contents withdrawn. This I have not done, for I wished to determine what effect testosterone had on the nodules without such a procedure.

The effect of testosterone propionate on the menstrual cycle was of interest. It has been shown that testosterone suppresses the œstrous cycle in laboratory animals (Robson 1936) and menstruation in monkeys (Zuckerman 1937, Hartman 1937) and in women (Gaines, Salmon, and Geist 1938). In the present series amenorrhœa was produced in some patients with 100 mg. a week, but as a general rule 200 mg. was required. This dose, however, was not always effective.

I find it difficult to explain the variations in the menstrual cycle with doses insufficient to cause amenorrhœa. In immature animals small doses of testosterone propionate have been shown to have a gonadotrophic effect (Starkey and Leathem 1938, Salmon 1938), and Parkes and Zuckerman (1938) have suggested that the ovarian response to testosterone depends on the pituitary. It is possible that the variations in the menstrual cycle with the smaller doses are related to a gonadotrophic effect of testosterone or are caused by irregular pituitary activity as a result of testosterone.

In conclusion, it is evident that the treatment of chronic mastitis with hormone preparations is still in the experimental stage. The results with testosterone propionate are promising, in that it brings about dramatic relief of pain and in some instances diminution in the size of the nodules. It must be emphasised, however, that it is a substance which should be used with caution in women, for prolonged amenorrhœa and atrophy of the endometrium are undesirable, and one should bear in mind the risk of increased growth of hair on the face, limbs, and trunk, which to a woman is a serious matter.

SUMMARY

Of 24 patients with painful breasts and chronic mastitis treated with intramuscular injections of sterile olive oil (as a control), pain was relieved in 13, whether they had lumps in the breast or not. No further treatment was given to 8 of these 13 who had no lumps.

The remaining 16 patients were treated with testosterone propionate injected intramuscularly in doses of 25 mg., 50 mg., and 100 mg., usually twice a week for several months. In 14 patients pain was relieved.

In 12 patients treated there were lumps in the breast; in 3 the lumps disappeared, but in 2 of these spontaneous disappearance could not be excluded, and

in 1 2925 mg. in five months was required, resulting in hypertrophy of the clitoris and extreme atrophy of the endometrium. In 5 patients there was some reduction in the size of the nodules. In 2 patients who were not improved fresh nodules appeared in the breast during treatment.

Menstruation was suppressed in 7 patients receiving the larger doses.

Increased growth of hair developed in 5 of the younger patients, in 4 with comparatively small doses, but this was not observed in older patients receiving much larger doses. It is emphasised that because of this complication and the undesirability of prolonged atrophy of the endometrium, testosterone propionate should be used with caution in women.

I should like to thank my surgical colleagues for referring the patients to me, and my house-physicians, Mr. G. Herbert, Mr. P. Quibell, Mr. P. F. Barwood, and Mr. A. G. Marshall, for their valuable assistance. I am also indebted to Mr. T. F. M. Smart, of Messrs. Ciba Ltd., and Dr. A. N. Macbeth, of N.V. Organon, for supplies of testosterone propionate (Perandren and Neo-hombreol).

REFERENCES

Atkins, H. J. B. (1938) *Lancet*, **1**, 707.
Bender, N. (1937) *C.R. Soc. franç. Gynéc.* **7**, 222.
Cheatle, G. L., and Cutler, M. (1931) Tumours of the Breast. London, p. 77.
Desmarest, E., and Capitain (1937) *Pr. méd.* **45**, 777, 1109.
Gaines, J. A., Salmon, U. J., and Geist, S. H. (1938) *Proc. Soc. exp. Biol. N.Y.* **38**, 779.
Hartman, C. G. (1937) *Ibid*, **37**, 87.
Keynes, G. (1923) *Brit. J. Surg.* **11**, 89.
Loeser, A. (1938) *Lancet*, **1**, 373; **2**, 319.
Parkes, A. S., and Zuckerman, S. (1938) *J. Physiol.* **93**, 16P.
Robson, J. M. (1936) *Proc. Soc. exp. Biol., N.Y.* **35**, 49.
Salmon, U. J. (1938) *Ibid*, **38**, 352.
Starkey, W. F., and Leathem, J. H. (1938) *Ibid*, **39**, 218.
Turpault, M. (1937) *C.R. Soc. franç. Gynéc.* **7**, 181.
Zuckerman, S. (1937) *Lancet*, **2**, 676.

DISSEMINATION OF INFECTION IN SCHOOL DORMITORIES

By F. G. Hobson, D.S.O., D.M. Oxfd, F.R.C.P.
HON. PHYSICIAN TO THE RADCLIFFE INFIRMARY, OXFORD

THE following extract from the report of the Royal Commission for improving the Sanitary Condition of Barracks, published in 1861, provides a useful introduction:—

> Before the soldier can be assured of having the amount of space required for health, there must be a distinct recognition that the amount given by regulation (i.e. 600 cubic feet and 3 feet between beds) is on no account to be tampered with. No increase of regimental strength, no want of store-rooms, libraries, or reading-rooms, should for an instant be permitted to interfere with it.
>
> It would never be pleaded, as a reason for reducing the soldier's ration of bread and meat, that a larger number of men had joined the regiment than the commissariat could provide for.
>
> Why should the soldier's air ration, which is equally important for his health and efficiency, be differently dealt with?
>
> In any case overcrowding should utterly be put an end to.
>
> If above a certain number of men are placed in a given cubic space, the lives of some of these men, and the health of others, is certain to be sacrificed.

If for the "soldier" and the "regiment" we substitute the "school-child" and "school," these observations apply with even greater force.

As Glover (1933) has pointed out:

> Schools are populated by aggregations of children at highly susceptible ages almost undiluted by the less susceptible adult, and moreover receive each term fresh batches of newcomers: thus they have less herd immunity than a natural herd or any ordinary family, and, as is only to be expected, they furnish us with some of the severest tests and most interesting problems in preventive medicine.

Le Fleming stated that "All schools with *very very few exceptions* are overcrowded to the detriment of the health of the pupils," and that this observation applied particularly to our public schools and their associated preparatory schools.

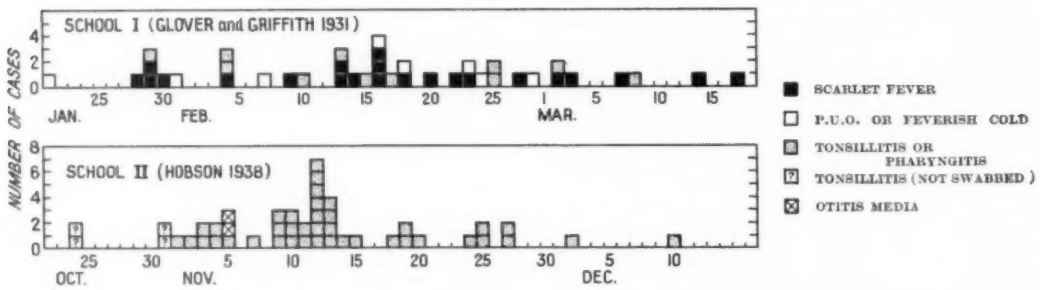
Sources of infection are always present in a school community, and new infection is liable to be introduced at any time. The dissemination of infection through such a community depends on the close contact of individuals and the ventilation of the apartments in which they meet. Unfavourable environmental conditions which produce overcrowding vary in different institutions and in different buildings, but overcrowding is usually most dangerous in dormitories, where for some eight hours susceptible individuals may be subject to intimate or repeated exposure to pathogenic organisms from the naso-pharyngeal secretions of neighbours, whether these be healthy carriers or in the stage of incubation of an active infection. The more successful the school, the greater the temptation to overcrowd the existing accommodation. A private school is not a charitable institution, and the good reputation of a school depends less on its health record than on other social, educational, and economic considerations. The health record of a school rarely finds a place in its printed official communications.

EPIDEMICS IN A SCHOOL

General experience shows that the Michaelmas and summer terms (in that order) are the two most favourable terms of the year for freedom from epidemic diseases and for the general well-being of school communities. The epidemics hereafter described are therefore more significant by virtue of the fact that they occurred in the two more favourable terms of the year. The school concerned in the present account is an entirely residential preparatory school in ideal surroundings, with spacious dining-rooms and recreation-rooms and good class-rooms. The commissariat is excellent, as shown by the regular termly increment in weight recorded in 95 per cent. of the boys in the school.

In the summer term an epidemic of german measles was succeeded by a nasopharyngeal epidemic due to *Streptococcus hæmolyticus* (not typed). Between May 22 and July 23 46 boys were admitted with acute nasopharyngeal infections and parents were warned at the end of term that casualties must be expected among the boys after their return home. Several such casualties occurred in the first few days of the holidays. This epidemic gave rise to the following complications: otitis media, 4 cases; adenitis, 3 cases; erythema and nephritis, 1 case (the only case that developed a "scarlatinal" rash). This experience suggested that environmental conditions were unsatisfactory, and that there was overcrowding, probably in the dormitories.

In the succeeding Michaelmas term the epidemic developed which is now described in detail. The term opened with a series of cases of feverish colds and bronchitis, but with no evidence of any appreciable faucial infection. There were 24 such cases between Sept. 21 and Oct. 24, on which date 2 cases of acute tonsillitis developed, to be succeeded by 2 more cases on Oct. 31. From Nov. 1 each of the succeeding 42 cases of tonsillitis and pharyngitis was swabbed and the organism typed.



Bacteriology. — The prevalent organism was *S. hæmolyticus* type II. All swabs were examined and typed by Dr. F. E. Camps, using Griffith's technique, and the organism was recovered in pure culture from 41 of the 42 cases. This organism is in general associated with high erythrogenic properties or in other words is regarded as a highly "scarlatinal" strain. The accompanying figure illustrates the fact that the same strain in different communities may produce very different epidemics.

Five members of the resident and domestic staff also succumbed to the same infection.

Clinical features.—The tonsillitis or pharyngitis (in the tonsillectomised) was characterised by a white filmy mucoid secretion with scattered points of exudate at the follicular orifices of the tonsils or on the lateral pharyngeal bands and on the summits of the discrete lymphoid nodules on the posterior pharyngeal wall. The clinical picture in each case was remarkably constant.

In common with most private preparatory schools the population was highly tonsillectomised (80 per cent.).

Surgical complications developed in 3 tonsillectomised patients: sinusitis 1; otitis media 1; and otitis media and mastoiditis 1. A transient albuminuria, which later disappeared, was present in 5 cases in the third week of convalescence. Apart from the surgical complications the duration of the disease was short, and in view of the "scarlatinal" attribute of the causal organism it is interesting that there was no case of erythema (scarlet fever) among 41 cases.

Treatment.—Every patient was treated with Proseptasine (benzene-*p*-aminobenzenesulphonamide) 1 g. four-hourly and simple gargles.

Epidemiology.—The epidemic showed the relentless slow tempo characteristic of an infection due to *S. hæmolyticus* in a susceptible community free from concomitant coryzal infections (Glover and Griffith 1931, Hobson 1938), a feature which was equally obvious in the epidemic of the previous summer term (see figure).

Environmental conditions.—The minimum of space recommended by the Board of Education for dormitories is 65 sq. ft. per bed, 3 ft. between the edges of adjacent beds, and 700 cu. ft. per person. The conditions in the eleven dormitories in the school are shown in the accompanying table. There were eight beds in each dormitory. The window space and ventilation in each dormitory were liberal, but no single dormitory conformed to the minimal standards laid down by the Board of Education, and in three dormitories the available space was approximately half the minimal standard.

For purposes of illustration the dormitories have been given a numerical order which is the reverse of their claim to excellence. On theoretical grounds the spread of disease in dormitories should be in inverse ratio to the space available for each individual, and the table shows that there is a striking correspondence between theory and practice.

Dormitory No.	Per bed		Cases of infection or reinfection	Dormitory No.	Per bed		Cases of infection or reinfection
	Floor space (sq. ft.)	Cubic space (cu. ft.)			Floor space (sq. ft.)	Cubic space (cu. ft.)	
1	37½	378	10	7	42¾	428	4
2	39½	398	8	8	44	439	3
3	39½	398	6	9	46	411	4
4	40½	377	5	10	45½	413	4
5	40½	377	5	11	54½	518	3
6	41½	415	3				

DISCUSSION

It would be reasonable to consider that the publication of the details of an epidemic such as that now described was no more than preaching to the converted, in that it has been addressed to a professional audience. Nevertheless it is true that extremely few school medical officers have had any specific training in the highly specialised epidemiological problems of closed communities. Only by affirmation, repetition, and contagion will the elementary truths of the epidemiology of closed communities be established and generally accepted by the responsible authorities. In the absence of any specific training for school medical officers in the relevant branches of preventive medicine, and in the presence of the autocratic ignorance of headmasters and boards of management, the incidence of epidemic diseases and their complications is more readily attributed to misfortune than to mismanagement and faulty organisation.

Eighty years after the elementary truths of environmental hygiene were stated in the report of the royal commission of 1861 we have to deplore that many headmasters and boards of management are even now apparently not aware that "if above a certain number of *children* are placed in a given cubic space, the lives of some of these *children* and the health of others, is certain to be sacrificed." Few parents are aware of the dangers to which their offspring may be exposed in a school environment where there is overcrowding, and still fewer possess the courage or the critical faculty necessary to pass judgment on the details of an establishment which is usually inspected in the most favourable circumstances

and under the guidance of the proprietors or their representatives.

The prestige of an established institution provides a formidable obstruction to criticism. The reverse side of the "old school tie" was never intended for public inspection.

SUMMARY

(1) An epidemic in a residential school is described, due to *S. hæmolyticus* type II.

(2) The incidence of infection and reinfection was intimately related to the degree of overcrowding in the dormitories.

(3) The epidemic showed the characteristic slow tempo of a pure streptococcal epidemic.

(4) In this epidemic there was no single case of scarlet fever, although the prevalent organism is generally associated with highly erythrogenic properties.

REFERENCES

Board of Education (1931) Educational Pamphlet No. 86, London.
Dudley, S. F., *Spec. Rep. Ser. med. Res. Coun., Lond.* No. 3.
Glover, J. A. (1933) *Lancet*, **2**, 1224.
— and Griffith, F. (1931) *Brit. med. J.* **2**, 521.
Hobson, F. G. (1938) Medical Practice in Residential Schools.
Le Fleming, E. K. (1934) *Prep. School Rev.* p. 37.

STOMATITIS OF DIETARY ORIGIN

BY W. R. AYKROYD, M.D., Sc.D. Dubl.

DIRECTOR OF NUTRITION RESEARCH, INDIAN RESEARCH FUND ASSOCIATION

RAO SAHIB B. G. KRISHNAN

ASSISTANT SURGEON; AND

R. PASSMORE, B.M. Oxfd.

CAPTAIN, INDIAN MEDICAL SERVICE; ASSISTANT DIRECTOR OF NUTRITION RESEARCH

(*From the Nutrition Research Laboratories, I.R.F.A., Coonoor, S. India*)

Two articles have recently appeared in THE LANCET, dealing with clinical conditions, other than pellagra, which appear to be caused by a deficiency of some factor or factors in the vitamin-B_2 complex.

Katzenellenbogen (1939) describes endemic glossitis in Palestine, and records that in 21 out of 24 cases the administration of nicotinic acid produced striking improvement.

Landor (1939), writing on deficiency of vitamin B_2 in Malaya, reports that 10 prisoners with eczema of the scrotum, some of whom also had stomatitis, were given nicotinic acid; this treatment improved neither the eczema nor the sore mouth. Subsequently the administration of marmite caused the rapid disappearance of both oral and scrotal lesions. The dose of nicotinic acid given by these workers was 200–500 mg. daily.

Sebrell and Butler (1938) describe lesions of the lips (cheilosis) in 10 women fed on a deficient diet. There was apparently no glossitis in these cases. Nicotinic acid (100 mg. daily) produced no obvious improvement, but cure followed the daily administration of 1–2 mg. of riboflavin, another factor in the vitamin-B_2 complex.

All these authors refer to the angular stomatitis or sore mouth studied by us in India (Aykroyd and Krishnan 1936, 1937, 1938) and assume that this condition is related to those they have observed.

Previous investigations (Aykroyd and Krishnan 1936, 1937, 1938) have shown that stomatitis is common in Indians of the poorer classes living on a diet largely composed of rice and deficient in milk and vegetables.

The following description may be quoted:

"In a typical case white patches are visible at the angles of the mouth. The epithelium in this area has a sodden appearance, and the presence of fungus infection is suggested. White patches may extend inwards from the angles of the mouth to the mucous membrane of the cheek. Fissures are often present at the labial angles. Erosion of the mucous membrane of the tongue, particularly marked at the sides and the tip, is usually observed. Sometimes cracks are visible on the surface of the anterior part of the tongue. In severe cases much of the anterior part of the buccal cavity is red and eroded, and eating is painful. The posterior part of the cavity and the larnyx seem not to be involved in the type of case usually encountered. The general term 'sore mouth' is often used by the laity to describe the condition."

Cases are sometimes observed in which glossitis is present with little involvement of the angles of the mouth, and vice versa, but as a rule angular stomatitis is accompanied by erosion of the tongue. Cracking of the lips is often seen. Nicholls and Nimalasuriya (1939) remark that "angular stomatitis and superficial erosion of the tongue . . . are almost certainly due to the same deficiency and will be alluded to as sore mouth." The observations of these workers were made in Ceylon, where dietary conditions are very similar to those found in South India. Excoriations at the palpebral angles and in the region of the alæ of the nose, erosion of the mucocutaneous junctions of the prepuce, anus and vagina, and eczema of the scrotum may also develop in persons with stomatitis. In our experience these conditions are usually found when stomatitis is severe. Many cases of stomatitis are observed in which there are no lesions elsewhere. The symmetrical dermatitis of pellagra is absent, no matter how severe the condition of the mouth.

The condition can be cured by skimmed milk, eggs, and dried yeast, unheated or autoclaved (cod-liver oil is without effect); it disappears from institutions and groups after an all-round improvement of the diet and, in particular, the consumption of more vegetables. In our most recently reported investigation it was shown that stomatitis was cured or improved by alkaline autoclaved yeast. The flavin present in yeast is presumably largely destroyed by such treatment. On the basis of these results we concluded that "the anti-stomatitis vitamin is probably identical with the factor in the vitamin-B_2 complex which is effective in treating human pellagra."

Recent work has shown that pellagra can be dramatically relieved with nicotinic acid. The glossitis of pellagra improves within forty-eight hours of the start of treatment (Spies et al. 1938). True pellagra is rare among rice-eaters. Rice is, however, a poor source of nicotinic acid, particularly when highly milled (Swaminathan 1938). It thus appeared possible that the poor rice-eater's diet might be partially deficient in nicotinic acid, and that this deficiency might be the cause of stomatitis and associated conditions. Accordingly we investigated the effect of nicotinic acid on sore mouth.

PRESENT INVESTIGATION

A series of cases on a group of tea estates was first investigated. These patients were living on a diet of parboiled milled rice with very limited quantities of pulses, vegetables, and fruit, and no milk or flesh food. Besides stomatitis, some of these patients developed excoriation and desquamation at the mucocutaneous

junctions of the anus, vagina, and prepuce, resembling the "orogenital syndrome" observed by Nair (1939) in Vizagapatam. Eczematous conditions of the scrotum, similar to those described by Nair and by Landor (1939), were also seen. Xerophthalmia was common among the children on the estates, and probably many of the patients with stomatitis were also suffering from a partial deficiency of vitamin A. The group contained a few cases of phrynoderma, and most of the patients had rough dry skins.

Nicotinic acid 50 mg. daily was given to 14 patients for twenty-six days, and 9 patients, acting as controls, received no treatment. Of the 14 treated patients 4 greatly improved, 5 showed some improvement, and 5 remained unchanged. Of the 9 controls 3 showed slight improvement, 5 remained unchanged, and 1 became worse.

Illustrative case-records.—The following cases are given as typical examples:—

CASE 1.—Female, aged 20. The tongue was smooth and fissured. Angular stomatitis was severe and had been present for two years. Some blepharitis was present which had recently become much worse. The skin was very dry, but there was no phrynoderma. After twenty-one days' treatment with nicotinic acid 50 mg. daily both the glossitis and the angular stomatitis became much better. On the tongue new mucous membrane had regenerated, but some fissures persisted.

CASE 2.—Female, aged 17. The tongue was smooth and fissured, and there was definite angular stomatitis. The patient had had cod-liver oil for three weeks with no improvement. Phrynoderma was present. Some improvement was reported after treatment with nicotinic acid 50 mg. daily. An attack of malaria then occurred. Treatment was continued, but after twenty-six days no definite improvement could be noticed.

CASE 3.—Male, aged 23. The tongue was sore and fissured, with raw areas denuded of mucous membrane. Slight angular stomatitis was present, and there was some pain on swallowing. There were no genital lesions. The condition had persisted for eight months without treatment and was getting worse. The patient was treated with nicotinic acid 50 mg. daily. After thirteen days the glossitis was improved and the papillæ over the denuded areas were beginning to regenerate. The angular stomatitis had completely gone, and the patient felt much better. After twenty-six days the tongue appeared almost normal, with the fissures much reduced and the mucous membrane regenerated.

CASE 4.—Male, aged 22. The tongue was raw but not fissured. The angular stomatitis was slight but had been present a year. There was definite pain on swallowing. There had been no treatment, and the condition was getting worse. The patient was treated with nicotinic acid 50 mg. daily. After twenty-six days the glossitis was very much improved and new mucous membrane was regenerating. The pain on swallowing had gone, and the mouth was no longer sore. Some slight angular stomatitis still persisted.

CASE 5.—Male, aged 20. The tongue was red, smooth, and fissured. There was angular stomatitis, with extension inside the mouth and involvement of the whole buccal cavity. Phrynoderma and an eczematous condition of the scrotum were present. There was much excoriation at the mucocutaneous junction of both anus and prepuce. The condition had lasted five months and was getting worse. There was no definite improvement after twenty-six days' treatment with nicotinic acid 50 mg. daily.

The dose of nicotinic acid given in this series of cases was small in comparison with the dosage usually given in pellagra. It was nevertheless considerably in excess of the amount of nicotinic acid supplied by 1 oz. of skimmed-milk powder or of dried yeast, which contain about 5 and 20 mg. of nicotinic acid respectively (Swaminathan 1938). We had previously found that yeast and milk powder given daily in these quantities had a curative effect on stomatitis.

Treatment with larger doses.—In another series of 10 cases larger doses were given; these were mostly patients living in the neighbourhood of Coonoor. The following is a brief description of these cases:—

CASE 6.—Female, aged 20, with severe glossitis and much excoriation of the lips and labial angles. The patient also complained of burning pains in the hands and feet. Doses of 100 and 200 mg. of nicotinic acid were given during the first and second days of treatment respectively, and subsequently 400 mg. was administered daily for six days. The response of the buccal lesions to treatment was immediate and striking; improvement was visible within forty-eight hours. Within eight days the raw areas on the tongue were covered by new mucous membrane, the fissures were almost filled in, and all soreness of the mouth had disappeared. The angular stomatitis was cured, except that on one side a small white patch persisted.

CASE 7.—Male, aged 18, with angular stomatitis and glossitis, but no other lesions elsewhere. Nicotinic acid 1500 mg. was given in five days. The glossitis showed immediate improvement, but the angular stomatitis remained unchanged during the period of treatment.

CASE 8.—Male, aged 13, with glossitis and mild angular stomatitis, but no other lesions. Nicotinic acid 1900 mg. was administered in seven days. The result was a great improvement in the glossitis and angular stomatitis. All soreness disappeared. Two days after the administration of nicotinic acid was stopped the patient again complained of sore mouth, and superficial erosion of the tongue reappeared.

CASE 9.—Male, aged 17, with severe glossitis, angular stomatitis, and eczema of the penis and scrotum. This patient received 1500 mg. of nicotinic acid in five days, and the glossitis and angular stomatitis were completely healed. There was, however, no improvement in the eczema of the penis and scrotum during this period.

CASES 10–15.—Six patients, aged 6–18, were given nicotinic acid 200 mg. daily for fourteen days. In 3 of these there was a very rapid improvement in the tongue, with complete regeneration of the mucous membrane and a filling in of the deep fissures originally present at the sides, but no great change in the lesions at the angles of the mouth. Of the other 3 cases, in 1 there was improvement in the glossitis, but little in the labial lesions, and the remaining 2 patients did not show any definite amelioration during the fourteen days of treatment with nicotinic acid. The stomatitis in these 3 children rapidly disappeared when they were given 8 ozs. of reconstituted skimmed milk (1 oz. of milk powder) daily for fourteen days.

To the best of our knowledge the patients given nicotinic acid and the controls continued to consume the same ill-balanced diet largely composed of milled rice during the period of treatment.

Results.—Altogether we treated 24 cases of stomatitis with varying doses of nicotinic acid. Of these 9 responded rapidly and were either cured or very much improved; 7 showed definite improvement, but some signs persisted after prolonged treatment; and 8 did not show any improvement.

DISCUSSION

Taken as a whole, our results suggest that a deficiency of nicotinic acid is concerned in the causation

of some cases of stomatitis in rice-eaters consuming an ill-balanced diet. In most patients receiving the larger doses of nicotinic acid the glossitis immediately improved. Our observations therefore to some extent confirm those of Katzenellenbogen (1939), but the percentage of cases not improved by nicotinic acid treatment was larger in our series than in his.

In general the tongue responded more rapidly than the labial lesions to nicotinic acid. This finding might be related to the observation of Sebrell and Butler (1938) that cheilosis can be cured by flavin but not by nicotinic acid. But in our series there were several cases in which both the glossitis and the angular stomatitis responded simultaneously to nicotinic acid, and in one or two the stomatitis was cured while the glossitis remained unchanged. Katzenellenbogen (1939) describes lesions of the angles of the mouth besides glossitis in his series of cases but does not record any difference in the response of these conditions to nicotinic acid.

In one of our cases eczema of the scrotum persisted after the buccal conditions had disappeared on treatment with nicotinic acid. This agrees with the observations of Landor (1939). Our experience of the effect of nicotinic acid on lesions of the scrotum, anus, prepuce, and vagina has not been sufficient to allow any conclusions to be drawn.

Discrepancies between the accounts of stomatitis and associated conditions and their reaction to treatment given by various workers, and the lack of a satisfactory response to nicotinic acid in some of our cases, can probably be explained by the fact that a diet deficient in one factor in the vitamin-B_2 complex tends to be deficient in others. The old "heat-stable vitamin B_2" has been split up into several components. The chemical constitution of three of these—nicotinic acid, riboflavin, and vitamin B_6—is known; at least two more are well defined and their chemical nature and physiological properties are now being elucidated. These factors are closely associated in common food-stuffs. A diet largely composed of milled cereals or starchy roots is deficient in the B_2 group of vitamins. The degree to which the various components of the group are lacking differs according to the nature of the staple and supplementary foods. Further, diets deficient in vitamin B_2 also tend to be deficient in other vitamins.

The present situation is that workers in various parts of the world have reported syndromes ascribed to deficiency of vitamin B_2 which bear a general resemblance to each other but differ in various respects. Besides those described by Katzenellenbogen (1939), Landor and Pallister (1935), Sebrell and Butler (1938), Nair (1939), and Aykroyd and Krishnan (1936, 1937, 1938), there are also related conditions described by Wright (1930, 1936), Moore (1937), Williams (1935), Trowell (1937), and others in tropical Africa. Most of the above workers observed that improvement followed the administration of yeast or marmite.

Nair (1939) found that, whereas yeast, liver extract, and milk produced some improvement in the orogenital syndrome, the most satisfactory result was obtained when a well-balanced diet was given. This accords with the observation of Aykroyd and Krishnan (1937) that in children's institutions stomatitis only developed when the diet was largely composed of milled rice and contained little or no milk or vegetables. It is not found when the diet is a little above this level and rapidly disappears from an institution when even a slight improvement in the diet is made.

Katzenellenbogen (1939) records the fact that endemic glossitis in Palestine has a different seasonal incidence from that of pellagra, and he apparently does not regard the glossitis as an initial stage in the development of pellagra, in spite of the fact that he cured it with nicotinic acid. Landor (1939) likewise differentiates from classical pellagra the syndrome that he describes. We are also of the opinion that the term "pellagra" should not be applied to stomatitis and the lesions which sometimes accompany it in ill-nourished rice-eaters in India.

In certain parts of North India, in which maize is the staple cereal, classical pellagra is by no means uncommon (Bajaj 1939); but in the rice-eating areas true pellagra is rare. Cases are described from time to time, but these are usually regarded as clinical curiosities. Stomatitis, on the other hand, is extremely prevalent. In the field surveys carried out by the Nutrition Research Laboratories, schools have been visited in which 30 per cent. of the children had various degrees of sore mouth. If, as Stannus (1936) maintains, stomatitis is an early sign of pellagra, it is curious that, with perhaps hundreds of thousands of cases of stomatitis occurring annually, only a few mild cases of pellagra reach the hospitals.

One other fact of importance in this connexion may be mentioned. In occasional cases inflammation, beginning in the mouth, spreads down the gullet and the patient becomes dangerously ill, though still not showing the dermatitis of pellagra. Such cases were described by Dr. Cornish, sanitary commissioner, Madras Presidency, as long ago as 1877. His description is quoted by Porter (1889):—

> "In adults a symptom of the cachectic state was a white coating to the mucous membrane of the mouth, which cracked and peeled off in strips, leaving a glazed, red, raw, and painful surface underneath. This state was not so prevalent in the Royapettah famine sheds as in the 'Monegar Choultry' (an institution in Madras City for feeding famine victims), where it seemed to have some connexion with a deficiency of meat and vegetables in the dietary. Among the prisoners in the Coimbatore jail this aphthous condition is reported to have extended to the gullet, assumed an aggravated form, and caused many deaths."

Assuming that a deficiency of nicotinic acid plays a part in the causation of stomatitis in rice-eaters, one method of throwing light on the relation of stomatitis to pellagra and on the ætiology of either is the determination of the amount of nicotinic acid contained in food-stuffs, particularly rice and maize. Preliminary investigations in the Nutrition Research Laboratories suggest that the poor rice-eater's diet is not in all circumstances richer than the poor maize-eater's diet in nicotinic acid; and this observation is against the hypothesis that stomatitis follows a partial deficiency of nicotinic acid, whereas in pellagra the deprivation is more severe. At the same time, it renders more puzzling the fact that true pellagra is largely a maize-eater's disease. One would naturally expect maize to be poorer than other cereals in nicotonic acid.

The problem of vitamin-B_2 deficiency in its clinical aspects needs further clarification. We realise that the somewhat inconclusive results presented in this paper, and our attempts to explain them and relate them to those of other workers, leave many difficult questions unsolved.

SUMMARY

(1) Various doses of nicotinic acid have been given to 24 rice-eaters with stomatitis. In 16 of these the glossitis was much improved; in 8 there was little change.

(2) Stomatitis and the various lesions of the mucocutaneous junctions and skin, which sometimes accompany it, do not appear to be initial signs of true pellagra.

We acknowledge gratefully the assistance of Drs. J. E. Measham, S. Dorai Raj, and K. P. S. Nambiar, and Capt. T. Sommerville, I.M.S., in the collection and treatment of cases. The work of the laboratories is financed by the Indian Research Fund Association.

REFERENCES

Aykroyd, W. R., and Krishnan, B. G. (1936) *Indian J. med. Res.* **24**, 41.
— — (1937) *Ibid*, **24**, 707.
— — (1938) *Ibid*, **25**, 643.
Bajaj, N. L. (1939) *Indian med. Gaz.* **374**, 145.
Katzenellenbogen, I. (1939) *Lancet*, **1**, 1260.
Landor, J. V. (1939) *Ibid*, **1**, 1368.
— and Pallister, R.A. (1935) *Trans. R. Soc. trop. Med. Hyg.* **29**, 121.
Moore, D. G. F. (1937) *Lancet*, **1**, 1225.
Nair, V. G. (1939) *J. Indian med. Ass.* **8**, 1.
Nicholls, L., and Nimalasuriya, A. (1939) *Lancet*, **1**, 1432.
Porter, A. (1889) The Diseases of the Madras Famine of 1877–78, Madras.
Sebrell, W. H., and Butler, R. E. (1938) *U.S. Pub. Hlth Rep.* **53**, 2282.
Spies, T. D., Cooper, C., and Blankenhorn, M.A. (1938) *J. Amer. med. Ass.* **190**, 622.
Stannus, H. S. (1936) *Trop. Dis. Bull.* **33**, 729, 815, 885.
Swaminathan, M. (1938) *Indian J. med. Res.* **26**, 427.
Trowell, H. C. (1937) *Arch. Dis. Child.* **12**, 193.
Williams, C. D. (1935) *Lancet*, **2**, 1151.
Wright, E. J. (1930) Leitch's Dietetics in Warm Climates, London.
— (1936) *Brit. med. J.* **2**, 707.

EFFECT OF PROLACTIN ON LACTATION IN NURSING WOMEN

BY MEAVE KENNY, M.R.C.S., M.R.C.O.G.

FIRST ASSISTANT, DEPARTMENT OF OBSTETRICS AND GYNÆCOLOGY, BRITISH POSTGRADUATE MEDICAL SCHOOL, HAMMERSMITH (L.C.C.) HOSPITAL, LONDON; AND

EARL KING, Ph.D. Toronto

READER IN BIOCHEMISTRY IN THE UNIVERSITY OF LONDON AT THE BRITISH POSTGRADUATE MEDICAL SCHOOL

(*With notes on the preparation of prolactin by* NORMAN EVERS, B.Sc., F.I.C., *and* W. J. HURRAN, B.Sc.)

THE finding of a lactogenic factor in the anterior-pituitary gland by Stricker and Grueter (1929a and b) has been confirmed by numerous workers—e.g., Corner (1930), Gardner and Turner (1933), Selye, Collip, and Thomson (1933). Riddle, Bates, and Dykshorn (1933) have described a method for the preparation of an extract from ox pituitaries which is capable of inducing lactation in animals, and which they named prolactin. Later Bates and Riddle (1935) described an improved procedure and a standardisation of the preparation by assaying its stimulating influence on the growth of crop-glands of pigeons. It is now customary to express the potency of prolactin preparations in terms of the Riddle crop-gland units.

Prolactin prepared by their method is almost free from gonadotrophic activity but may contain the "glycotrophic factor" of Young (1936a and b), which diminishes the hypoglycæmic action of subsequently administered insulin and appears to facilitate the glycogenolytic response of the liver to the hypoglycæmia induced by insulin, although it does not induce glycogenolysis by the liver. Folley and Young (1937) increased the milk production of dairy cows by the administration of prolactin but found that the response in extra milk-secretion appeared to be related to the degree of glycotrophic activity rather than to the pigeon crop-gland activity.

Kurzrok et al. (1934) treated with prolactin 29 women in whom lactation had not developed adequately post partum: 21 showed a positive response in milk secretion, 4 a doubtfully positive, and 3 a negative. Ross (1938), in a carefully controlled experiment, demonstrated a significant increase in lactation in nursing mothers. Werner (1935) attempted to produce lactation in castrate girls by the combined use of œstrogenic hormones and prolactin. Although there was some stimulation and development of the breasts, no milk was secreted.

Local reactions to injections of prolactin, accompanied by temperatures of 101° and 102° F. were described by Ross (1938). Werner (1935) described severe local and anaphylactic reactions, and, in a second communication (1939), warned against the use of present preparations of prolactin, which he considered were impure and unsafe for human use.

METHOD OF INVESTIGATION

In early experiments carried out in the course of this investigation in the Hammersmith Hospital, in collaboration with Prof. J. Chassar Moir and Dr. J. D. Watt, the administration of small increasing doses of prolactin did not produce any of the ill effects noted by Ross (1938) and Werner (1935, 1939). There was, likewise, no evidence of a significant disturbance of carbohydrate metabolism. The small amounts of prolactin used, however, failed to produce any great increase in milk secretion, and the results appeared to be hopeful rather than conclusive.

In the experiments described in this communication two preparations of prolactin, one from ox pituitary and the other from sheep, were administered to 43 women during the period of lactation. The women were selected as deficient in milk secretion at different stages of this period up to the third month. In 3 cases milk secretion was absent until administration of prolactin was begun on the ninth or tenth day after delivery. All cases were followed up for at least three months, and most were seen during six or seven months.

Classification of results.—The response to administration was classified as positive, partial, or negative. A positive response indicated that the increase in milk secretion was maintained at over 3 oz. (100 c.cm.) a day. This standard was adopted to correlate our results with those of Kurzrok et al. (1934) and Ross (1938). As shown by figs. 1, 2, and 3, the increased yield of milk was usually much greater. Indeed, in 29 cases the amount became sufficient for the whole need of the baby until weaning at the sixth to seventh month. In no case of a positive response did the secretion diminish after the preliminary rise; nursing continued to be satisfactory throughout the three to seven months during which the women were followed up by us.

TABLE I—TYPE OF FEEDING USED 3–6 MONTHS AFTER IN TREATED AND CONTROL CASES

—		Breast only	Breast and complement	Bottle only	No information	—
TREATED—						
Response to prolactin	Positive..	29	3	0	—	32
	Partial ..	0	2	1	—	3
	Negative	0	1	7	—	8
CONTROL		8	7	27	1	43

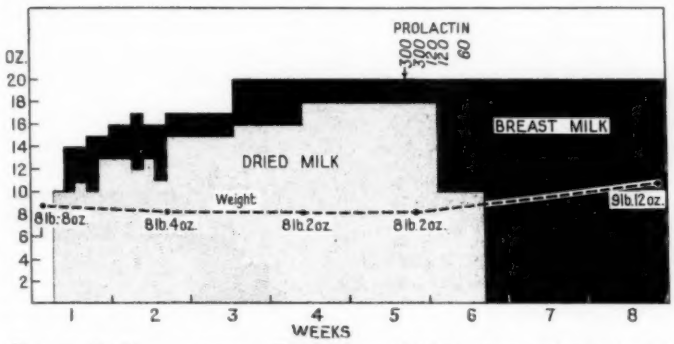


FIG. 1—Positive response. Lactation established after prolactin in 5th week; maintained to 7th month.

A partial response indicated an increased yield of 1½–3 oz. (50–100 c.cm.) of milk a day, or a larger yield which was not maintained when the injections of prolactin were stopped. Thus, in the case depicted in fig. 4, the increase amounted to 3 oz., 5 oz., 4 oz., and 5 oz. a day during treatment but fell to only 2 oz. thereafter; the discouraged mother weaned her baby three weeks later.

An increase of less than 1½ oz. (50 c.cm.) was classified as a negative response, a failure. Table I shows that none of these women (19 per cent. of the total treated) developed satisfactory lactation by other methods used subsequently.

Controls.—During the same months (September, 1938–May, 1939) 43 women classified as deficient lactators were observed as controls. They were picked at random from among such women in the lying-in wards, or, later, from those attending the postnatal and infant-welfare clinics of the hospital. Advice and encouragement, the electric or hand breast-pump, breast massage, and such "galactagogues" as barley-water, stout, or extra milk rations were prescribed in these cases. Fig. 5 and table I show that, in the early weeks of the period of lactation, these routine methods were completely or partially successful in a few cases. In the later weeks (fourth to eighth) it became more difficult to elicit any notable increase in milk secretion by the rather casual means possible in an outpatient department, and all but the most enthusiastic mothers usually abandoned nursing entirely at this stage. We do not suggest that the proportion of successes (21 per cent.) in our cases represents the highest figure that can be reached by such routine methods, but we are assured by the medical officers of many infant-welfare clinics that improvement is nearly impossible under ordinary out-patient conditions.

Mode of treatment.—Prolactin was given in the early stages of the period of lactation, when clinical experience or past history indicated that the patient would probably not have sufficient milk. In the later weeks deficiency or decrease in lactation was treated. It is our present practice to begin treatment as early as possible, so that efficient nursing may be established before discharge from hospital.

While the mothers were in hospital, the increase in the yield of milk was tested by weighing the baby before and after each feed. After discharge the effects of prolactin were checked either by the weight of the baby before and after a specimen breast-feed given in the outpatient department or by the description by the more intelligent mothers of the quantity of complementary feeding necessary for the thriving infants' daily needs. The baby's development and weight were examined at each follow-up visit in all cases.

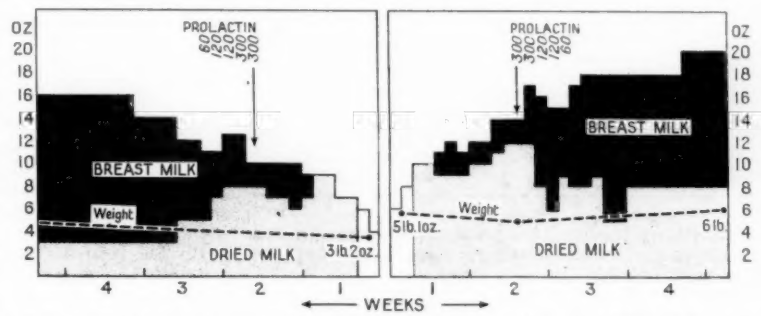


FIG. 2—Positive response. Premature twins. Lactation established following prolactin administration on 12th day of puerperium. Nursing satisfactory 5 months later.

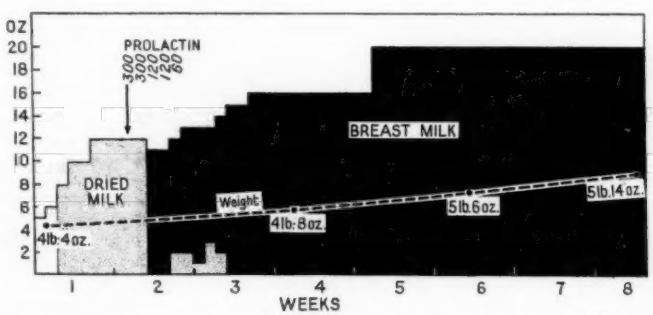


FIG. 3—Positive response. Premature child. No milk secretion for 10 days. Lactation established after treatment; maintained to 3rd month.

We employed a total dosage of 15 c.cm. (900 Riddle units) of prolactin in each case, spread over five days, thus:—

First and second days 5 c.cm. daily (2×300 R.U.).
Third and fourth days 2 c.cm. daily (2×120 R.U.).
Fifth day 1 c.cm. (60 R.U.).

The quantity was given by the intramuscular route into buttock or arm. To a few neurotic women an injection of sterile saline 2 c.cm. was given forty-eight hours before the start of treatment with prolactin. This suggestion therapy did not evoke a response in any case.

RESULTS

Fig. 5 shows that in three-quarters of the women with deficient lactation in the first eight weeks of the lactation period satisfactory nursing was induced with prolactin. The table has been compiled after checking the type of feeding used at period 3–7 months after treatment. The pride that the mother takes in her improved nursing ability undoubtedly helps to maintain the effect of the hormone throughout the normal period of lactation.* Of our cases 11 who reached the stage of weaning during the follow-up had no difficulty in abating the breast secretion by the usual methods at the desired time.

A further few cases showed only a temporary or moderate increase of milk secretion after the administration of prolactin; and in 19 per cent. there was either a very small increase or none at all. With the ordinary hospital or outpatient routine, in only 21 per cent. of similar untreated controls was satisfactory lactation established; in 16 per cent. a transient or moderate response was achieved; and in 63 per cent. of cases we failed altogether to improve the yield of milk.

TABLE II—HUMAN MILK ANALYSIS

	NORMAL LACTATION				PROLACTIN		
	Total solids	Lactose	Fats		Total solids	Lactose	Fats
	g./100 c.cm.	g./100 c.cm.	g./100 c.cm.		g./100 c.cm.	g./100 c.cm.	g./100. c.cm.
Mrs. A	13·2	4·78	4·32	Mrs. F	12·9	4·32	2·31
„ B	12·9	5·40	3·44	„ G	13·8	5·21	4·02
„ C	14·5	5·24	2·47	„ H	14·3	—	3·49
„ D	13·5	4·64	2·27	„ I	11·8	6·90	2·21
„ E	13·0	5·61	—	„ J	14·2	5·31	2·97
				„ K	12·0	4·57	2·28
				„ L	11·6	5·42	—
				„ M	11·7	5·42	—
				„ N	11·8	5·17	—

Table II shows that the quality of the milk secreted after administration of prolactin is essentially the same as that of samples taken from normal untreated women.

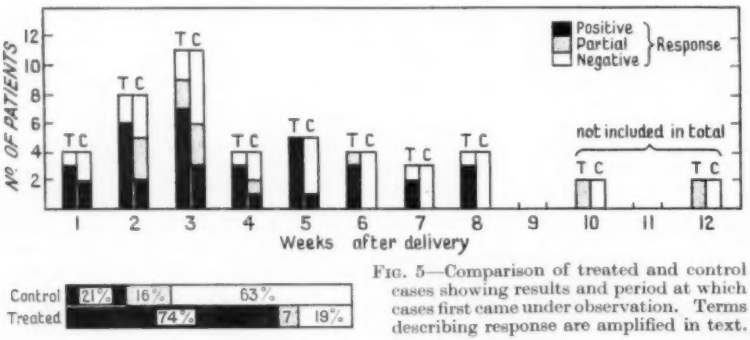


FIG. 5—Comparison of treated and control cases showing results and period at which cases first came under observation. Terms describing response are amplified in text.

SIDE EFFECTS

No local or systemic ill effects have been noticed after the administration of prolactin. There has not been complaint of excessive secretion or of engorgement of the breasts as reported by Morató-Manaro (1937); but it has come to our knowledge that two of our successfully treated cases are earning pin-money by selling their surplus milk to the human-milk bureau of a well-known maternity hospital.

Glucose-tolerance tests have not shown any departures from those of control lactating women.

A point raised by Nathanson and Fevold (1938) that large doses of prolactin may permanently disturb normal rhythm and even inhibit menstruation, is not borne out by the follow-up of our cases. Thus, 28 treated women have resumed normal menstruation in the first five months of the lactation period, 11 in three months, and 4 by the sixth week after delivery.

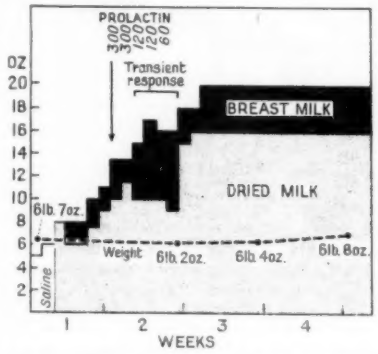


FIG. 4—Partial response. Transient small increase during course of prolactin not maintained. Nursing unsatisfactory, discontinued at 2nd month.

SUMMARY

(1) Two preparations of prolactin, one from ox pituitary and the other from sheep, have been administered to 43 women selected as deficient in milk secretion at different stages of the period of lactation.

(2) The response has been very encouraging.

(3) In the dosage described, the extracts appear to have no systemic or local ill effect. Glucose-tolerance tests have not shown any departures from those of control lactating women. Depression of the gonadotrophic function has not been observed.

(4) The quality of the milk secreted after administration of the extracts is essentially the same as that of control samples.

NOTES ON PREPARATION OF PROLACTIN

By Mr. Norman Evers.—Prolactin (Allen & Hanburys) has been prepared from *ox pituitary* by the method originally proposed by Bates and Riddle (1935), suitably modified for production on a large scale. The method consists essentially in extraction of the anterior portions of ox-pituitary glands with alkaline alcohol at pH 9–10, followed by precipitation at pH 5.5–6 at a higher concentration of alcohol. A solution of this crude fraction is reprecipitated at pH 3–4, to remove gonadotrophic and thyrotrophic activity. The insoluble fraction is further purified by iso-electric precipitation.

The potency has been determined by the increase in weight of the crop-glands of pigeons, and the strength of the solution is standardised at 60 Riddle-Bates units per ml.

* This contrasts happily with conditions shown in recent correspondence in the *British Medical Journal* (1938, **2**, 729–1390). Thus, figures from Newcastle show that, although 87·8 per cent. of mothers are breast-feeding their babies at the end of the lying-in period, after three months 58·4 per cent., and after six months only 34·7 per cent., are still nursing. In Edinburgh, at similar epochs, the figures are 55 per cent. and 38·5 per cent.

Prolactin (A. & H.) is practically free from gonadotrophic and thyrotrophic activity.

By Mr. W. J. Hurran.—Physolactin (Lactogenic Hormone, Glaxo Laboratories) is an extract of *sheep pituitary* prepared by a modification of the method of Bates and Riddle (1935) and has a potency of about 60 Riddle units of prolactin per ml. The batch used in making the solution for the present work was extracted from sheep pituitary and has been examined for various physiological activities, which may be summarised as follows:—

Prolactin: 8–10 Riddle units/mg.
Gonadotrophic activity: traces.
Thyrotrophic activity: about 0·05 Rowlands-Parkes unit per mg.
Glycotrophic activity, measured by the assay method of Young (1938): such that 30–60 mg. is sufficient to prevent the hypoglycæmic action of 2 units of insulin.
Oxytocic activity: none detectable in 10 mg.

On a weight-ratio basis amounts equivalent to about 800 and 200 times the total human dose have been administered respectively to immature rats and guineapigs for five days and have given no evidence of toxicity. Attempts to induce anaphylaxis in guineapigs have given completely negative results.

Our thanks are due to Dr. F. G. Young and Dr. Alan Moncrieff, to whose suggestion this investigation is due, for their continued interest in its course; to Prof. Chassar Moir and Dr. Watt, whose earlier experiments with prolactin in this hospital helped us to determine the optimal dosage; to Prof. James Young, in whose department the work was carried out; to Dr. Geraldine Maloney and Dr. Rose Weinberg for their help with patients and literature; and to Mr. Evers and Mr. Hurran of Messrs. Allen and Hanburys and Glaxo Laboratories respectively for generous supplies of the prolactin extracts. This paper is published with the permission of Sir Frederick Menzies, chief medical officer, London County Council.

REFERENCES

Bates, R. W., and Riddle, O. (1935) *J. Pharmacol.* **55**, 365.
Corner, G. W. (1930) *Amer. J. Physiol.* **95**, 43.
Folley, S. J., and Young, F. G. (1937) *Proc. Biochem. Soc., Chem. and Indust.* **56**, 96.
Gardner, W. U., and Turner, C. W. (1933) *Mo. Agri. Expt. Sta. Res. Bull.* **196**, 5.
Kurzrok, R., Bates, R. W., Riddle, O., and Miller, E. G., jun. (1934) *Endocrinology*, **18**, 18.
Morató-Manaro, J. (1937) *Arch. urug. Med.* **11**, 41.
Nathanson, I. T., and Fevold, H. L. (1938) *Endocrinology*, **22**, 86.
Riddle, O., Bates, R. W., and Dykshorn, S. W. (1933) *Amer. J. Physiol.* **105**, 191.
Ross, J. R. (1938) *Endocrinology*, **22**, 429.
Selye, H., Collip, J. B., and Thomson, D. L. (1933) *Proc. Soc. exp. Biol., N.Y.* **31**, 82.
Stricker, P., Grueter, F. (1929a) *C.R. Soc. Biol. Paris*, **99**, 1978.
— — (1929b) *Pr. méd.* **37**, 1268.
Werner, A. A. (1935) *Endocrinology*, **19**, 144.
— (1939) *Ibid*, **24**, 119.
Young, F. G. (1936a) *J. Physiol.* **87**, 13.
— (1936b) *Lancet*, **2**, 297.
— (1938) *Bio-chem. J.* **32**, 1521.

MEDICAL AID FOR CHILDREN IN RECEPTION AREAS.—The Minister of Health urges evacuating authorities to give assistance to receiving areas by releasing as many medical officers, school dentists, nurses, midwives, and health visitors as possible. Where an arrangement of this kind cannot be made and additional staff has to be engaged the cost will not fall on the receiving authority. He stresses the importance in receiving areas of providing cheap milk and meals for expectant and nursing mothers and young children. Sick-bay accommodation should be provided in separate houses for children suffering from minor ailments or convalescent from more serious illnesses who cannot be properly cared for in private houses. A trained nurse should be in attendance and children should be visited regularly by a medical practitioner. Local authorities should also consider establishing mothers' hostels within easy reach of the maternity homes for ante- and post-natal cases, as well as hostels for "problem children" who are unacceptable in ordinary billets. These should have a staff experienced in child-guidance methods.

BLOOD-GROUPING TECHNIQUE WITH TEST FOR SYPHILIS

BY A. H. WALTERS

(*From the Pathological Department, Albert Dock Hospital, London*)

ADDITIONAL attention is now being paid to the blood-grouping both of recipients and of prospective donors. In the shock room of the Albert Dock Hospital fracture clinic a simple and rapid technique has been evolved enabling blood to be classified anywhere and at any time. The necessary apparatus (fig. 1) consists of fifteen ordinary leucocyte-counting pipettes, a small bottle containing a 2 per cent. solution of sodium citrate in physiological saline, a skin-puncture needle, a small bottle of ether, pledgets of cotton-wool, blood-grouping serum types A and B, and Garrow's agglutinometer (Garrow 1917). Garrow's agglutinometer (made by Messrs. Baird and Tatlock) is described as "an agglutinometer slab, a piece of plate glass 11¾ in. long by 1½ in. wide, divided into a number of partitions by double grooves running at regular intervals of 1 cm. in order to prevent solutions from intermingling. To promote intimate mixture of solutions the slab is made to revolve by means of clockwork at a uniform rate of 15 revs. per min." (Manson-Bahr 1935).

An agglutinometer is housed in a box with handle attached. A number of leucocyte-counting pipettes, ether, citrate, &c., can be placed in the box all ready for use. If blood is to be grouped anywhere in the hospital or outside, the box can be easily carried like an attaché case to the scene and the grouping done there at once. One complete set of apparatus as described is set up ready for use in the shock room on a trolley and covered with a distinctive coloured cloth. Blood can be grouped there at the patient's side in about 1½ min. The method appears to be almost foolproof.

DONORS

Method.—The pad of the prospective donor's third finger is cleaned with ether and punctured with a needle, and blood is sucked up into a leucocyte-counting pipette to the mark 1. The solution of sodium citrate is next sucked up to the mark 2. The solutions are mixed in the usual manner by rotating the pipette several times. The pipette is numbered 1 with a grease pencil and set down on the bench. A similar sample of blood is taken from each prospective donor in turn (not more than fifteen are done at one time) and labelled with the appropriate number.

Test.—One or two drops of the citrated blood are first expelled from the leucocyte-counting pipette; then a small drop (about 0·015 c.cm.) is placed directly on each of the first two partitions of the agglutinometer glass slab. A drop of group-A serum is placed on the first partition adjacent to but separate from the drop of citrated blood, and a drop of group-B serum is similarly placed adjacent to the drop of citrated blood on the second partition. The agglutinometer is set revolving for 1 min., after which it is stopped, the glass slab is removed horizontally for closer inspection, and the result is read. Positive agglutination shows up as large coarse red flocculi. The slab held a couple of feet above a white background of paper or a sink increases visibility by day, and a torch shone up from underneath the slab makes reading easier at night. The agglutinometer

slab is divided into thirty partitions. Hence, two partitions being used for each specimen, the blood of any number of donors up to fifteen can be classified at the same time.

Results.—This method has been in use for six months, during which several hundred sera have been tested against microscopical controls. Doubtful or borderline agglutinations show up as fine red floccules and are just as easily spotted by the agglutinometer method as by the microscope (fig. 2).

RECIPIENTS

Before grouping a recipient's hæmoglobin percentage must be taken into consideration. If it is not already known, it should be roughly estimated by Tallquist's method with white blotting-paper. The concentration of red blood corpuscles in citrate solution for a donor with about 100 per cent. of hæmoglobin, when the above technique is employed, is preferably 1 in 10. The recipient's hæmoglobin percentage should be divided by 100, and the figure thus obtained gives the amount of blood required in number of parts to be made up to a total of ten parts with the solution of sodium citrate. Thus, if a recipient's hæmoglobin percentage is about 50, then 50 divided by 100 equals 2, which is the amount of blood required in number of parts to be made up to a total of ten parts with the solution of sodium citrate. Blood should be sucked up from the recipient to mark 1 on a leucocyte-counting pipette, a slight amount of air drawn in to move the column of blood a very short distance up the pipette, and blood drawn in again from the finger up to mark 1. Citrate is then drawn in up to mark 2 on the pipette, thus giving the 2 in 10 dilution of blood required in this case. The resultant solution of citrated blood is then employed for grouping by the technique described above.

CROSS-GROUPING

Most of the donors reporting at the Albert Dock Hospital are of known group. If the surgeon in charge decides that there is time for the recipient to be cross-grouped, 2 c.cm. of blood is drawn from the donor, preferably from the median basilic vein of the arm which is not being used for transfusion, and placed in a tube about 8 mm. in diameter and 9 cm. long. The tube is placed at once in a small water-bath at 37° C. for 25 min. This saves time by promoting rapid clotting of the red blood corpuscles. The blood is then centrifuged for about 5 min. (A portable hand centrifuge is all that is necessary.) About 0·5 c.cm. of serum is then drawn off from the clot with a teat pipette. In the meantime a citrated solution of the recipient's blood has been obtained as described above. A drop of the donor's serum and a drop of the recipient's citrated solution of red blood corpuscles are tested on the agglutinometer for compatibility by technique as outlined above for groups A and B.

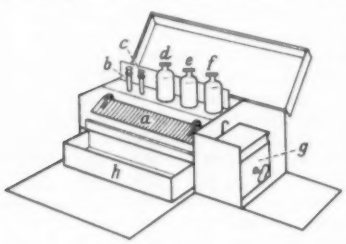


FIG. 1—Garrow's agglutinometer: (*a*) glass slab; (*b*) blood-grouping sera; (*c*) Laughlen's reagent; (*d*) citrate; (*e*) ether; (*f*) saline; (*g*) clockwork motor; (*h*) drawer to hold pipettes, cotton-wool, and needle.

TEST FOR SYPHILIS

Laughlen's reagent (Laughlen 1935) is used for the test for syphilis. It is prepared commercially in tubes containing 1 c.cm. by Lederle Inc., New York. Another tube, containing 1 c.cm. of a 10 per cent. saline solution is dispatched with every 1 c.cm. batch of antigen. For activation, 0·15 c.cm. of the 10 per cent. saline solution is added to 1 c.cm. of Laughlen's reagent, and the tube is shaken and allowed to stand for twenty-four to forty-eight ho (preferably the latter) at room temperature before used. It is stored at room temperature and r active for at least fourteen days. Amounts than 1 c.cm. of the antigen may be activat saline if only a few tests are being done. The antigen lasts for months. A date of expiry is on the packing of each batch. The ap required consists of two 0·2 c.cm. pipettes (Ka pattern), a bottle containing a 0·9 per cent. solution; and activated Laughlen's reagent.

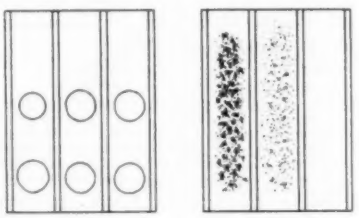


FIG. 2—Agglutinometer slab: (*a*) adjacent but separate drops before rotation; (*b*) three different results of test for syphilis after rotation: coarse floccules (strong positive); fine floccules (weak positive); and no floccules (negative).

Method.—The remainder of the donor's serum placed in a water-bath at 63° C. for 3 min. for com plement inactivation. Next, 0·2 c.cm. is drawn up into a Kahn pipette. The pipette is held vertically over the agglutinometer and lowered until the tip just touches a partition on the glass slab, and a drop of 0·013 c.cm. is delivered from the pipette. If several tests are being performed at the same time, the pipette is washed out twice with the 0·9 per cent. saline solution, and the outside of it is wiped dry with a clean cloth each time between the deliveries of drops of serum. Next, the tube containing activated Laughlen's reagent is shaken up, and 0·2 c.cm. of the reagent is drawn up into the other Kahn pipette. The pipette is held vertically as before, and drops of 0·01 c.cm. of antigen are delivered on to each partition adjacent to a drop of serum. The agglutinometer is now allowed to revolve for 5 min. If any drops are not mingling on any one partition after 30 sec. of rotation, the skin-puncture needle may be drawn rapidly across the two drops to effect contact and rotation continued. After 5 min. of rotation the slab is taken out of the agglutinometer, held horizontally, and examined for red floccules, as in blood-grouping. Then the slab is replaced and allowed to rotate again up to a total time of 9 min. from the start of the test, after which the slab is again removed and examined. Coarse red flocculi indicate a strongly positive reaction, and fine flocculi indicate a weak or doubtful syphilis reaction. If possible, it is desirable to use controls of known positive and negative sera.

Results obtained with the Laughlen reaction on 400 sera with this technique agreed within 98 per

cent. with the Kahn test (Walters 1939). Laughlen (1935) found the reaction to be 99 per cent. in agreement with the Kahn test, and Robinson and Stroud (1937) found 97 per cent. agreement with the Kahn test in 1000 sera tested. The Laughlen reaction may be considered a useful general rapid test for syphilis, subject to later confirmation by the Kahn test in all sera giving a doubtful positive result.

SUMMARY

A rapid technique for blood-grouping is described which can be carried out under almost any conditions; and a rapid method of cross-agglutination and syphilis test for donor is given.

My thanks are due to Dr. H. M. Hanschell, director of the V.D. clinic, and to Mr. H. E. Griffiths, director of the fracture clinic, of the Albert Dock Hospital, for permission to publish this paper.

REFERENCES

Garrow, R. P. (1917) *J.R. Army med. Cps*, **28**, 566.
Laughlen, G. S. (1935) *Canad. med. Ass. J.* **33**, 179.
Manson-Bahr, P. H. (1935) in Manson's Tropical Diseases, 10th ed., London, p. 552.
Robinson, F. H., and Stroud, G. M. (1937) *J. Amer. med. Ass.* **108**, 1170.
Walters, A. H. (1939) *Brit. J. vener. Dis.* **15**, 228.

...al and Laboratory Notes

...ON OF SULFAPYRIDINE ('M. & B. 693)

...N DER ZOO DE JONG, Ph.D.
...l Department of the University ...l, Groningen, Holland)

...ministration of sulfapyridine frequent ...rmations of the drug in the body-...sary for control, and a rapid method ..., its concentration is therefore desirable. ...d here proposed is a modification of that ...rward by Marshall, Kendall Emerson and Cutting (1937). It allows many estimations to be done with small quantities of material in a short time.

The diazotisation of sulfapyridine has been shown to take place rapidly in an aqueous acid solution and not in an alcoholic acid solution. Traces of sodium nitrite suffice, while larger quantities may prove deleterious, especially with low concentrations of sulfapyridine. The addition of dimethyl α-naphthylamine, however, leads in a 70 per cent. alcohol solution to a very rapid development of the colour, and the colour develops slower with lower alcoholic concentration. The red-violet colour produced is compared with a standard aqueous solution of phenolsulphonephthalein containing added sodium phosphate. The comparison may be done in any of the usual models of colorimeter. The total sulfapyridine can be estimated in the same manner if the solution contains 10 per cent. trichloracetic acid and is heated in a boiling water bath for half an hour. The procedure is as follows.

First 1 c.cm. of serum or other body-fluid is mixed with 2 c.cm. of distilled water; then 1 c.cm. of 20 per cent. trichloracetic acid (20 g. trichloracetic acid dissolved in 80 c.cm. water) is added drop by drop with shaking. After standing for five minutes the liquid is centrifuged or filtered through a small dry filter. To 1 c.cm. of the filtrate is added 0·1 c.cm. (two drops) of a 0·15 per cent. solution of sodium nitrite. After two minutes 3 c.cm. of a 0·1 per cent. solution of dimethyl α-naphthylamine in 95 per cent. alcohol is added and the whole mixed by shaking. After standing for five to ten minutes the colour is compared with the standard. If the colour is much stronger than the standard the liquid must be diluted with the solution of dimethyl α-naphthylamine.

By precipitating the proteins in serum by a dilution of 1 : 4, as above, we recovered 94 per cent. of added sulfapyridine at a concentration of 5–10 mg. per cent., and 100 per cent. at a lower concentration. The standard is made up from a stock solution prepared as follows.

Dissolve exactly 20 mg. of phenol red and about 1 g. of disodium hydrogen phosphate ($Na_2HPO_4 \cdot 2H_2O$) in distilled water and make the solution up to 100 c.cm. The standard for use is made by dissolving about 1 g. of disodium hydrogen phosphate in water, adding 5·6 c.cm. of the stock solution and diluting it to 100 c.cm.

The standard corresponds to a concentration of sulfapyridine of 10 mg. per cent., or 2·5 mg. per cent. without diluting four times. It is advisable to control the standard at the beginning and at intervals with an acidified sulfapyridine solution of known strength. It is possible to use the same procedure as a micro-method by reducing the quantities of the different solutions. The free sulfapyridine in the filtrate is determined in this way. To determine the total sulfapyridine the process is as follows.

Dilute in a graduated tube 1 c.cm. of trichloracetic filtrate with half its volume of 20 per cent. trichloracetic acid (non-protein fluids with an equal volume) and heat the tube in a flask with boiling water for half an hour. After cooling adjust the volume to 1·5 c.cm. with water; then add 0·15 c.cm. (3 drops) of 0·15 per cent. sodium nitrite solution and after two minutes 4·5 c.cm. of dimethyl α-naphthylamine. The colour can be compared after five or ten minutes. The result must be multiplied by 1·5.

REFERENCE

Marshall, E. K., Cutting, W. C., and Emerson, K. (1937) *J. Amer. Med. Assoc.* **108**, 953.

ARCUS LIPOIDES OF THE EAR-DRUM

BY J. BERBERICH, M.D.
FORMERLY PROFESSOR FOR EAR, NOSE, AND THROAT AT FRANKFORT-ON-MAIN

FROM the middle of last century it has been known, through the investigations of Canton (1851), Virchow (1852), and His (1856), that an opacity consisting of pathological deposits of "fat" often develops in the cornea near the margin of the iris. This opacity, being found mainly in elderly people, was called arcus senilis corneæ. It was soon shown, however, to develop sometimes in younger people: persons under 30 (De Lieto-Vollaro 1910) and children (Attias 1912, Joël 1924, Versé 1925, and Rohrschneider 1925). Since there was no difference between the morbid histology of the arcus senilis and that of the arcus juvenilis, Versé rightly suggested that both of them should be called the arcus lipoides corneæ: he based his conclusion principally on the results of experiments on animals. All who systematically search for the arcus lipoides in hospitals are bound to admit that this change is seen far more frequently than one might at first suppose, and, above all, that it is by no means only a sign of old age. When the arcus is not macroscopically recognisable it can sometimes be demonstrated with the slit-lamp microscope, with which it is most interesting to follow the increasing deposition of lipoid in the cornea.

slab is divided into thirty partitions. Hence, two partitions being used for each specimen, the blood of any number of donors up to fifteen can be classified at the same time.

Results.—This method has been in use for six months, during which several hundred sera have been tested against microscopical controls. Doubtful or borderline agglutinations show up as fine red floccules and are just as easily spotted by the agglutinometer method as by the microscope (fig. 2).

RECIPIENTS

Before grouping a recipient's hæmoglobin percentage must be taken into consideration. If it is not already known, it should be roughly estimated by Tallquist's method with white blotting-paper. The concentration of red blood corpuscles in citrate solution for a donor with about 100 per cent. of hæmoglobin, when the above technique is employed, is preferably 1 in 10. The recipient's hæmoglobin percentage should be divided by 100, and the figure thus obtained gives the amount of blood required in number of parts to be made up to a total of ten parts with the solution of sodium citrate. Thus, if a recipient's hæmoglobin percentage is about 50, then 50 divided by 100 equals 2, which is the amount of blood required in number of parts to be made up to a total of ten parts with the solution of sodium citrate. Blood should be sucked up from the recipient to mark 1 on a leucocyte-counting pipette, a slight amount of air drawn in to move the column of blood a very short distance up the pipette, and blood drawn in again from the finger up to mark 1. Citrate is then drawn in up to mark 2 on the pipette, thus giving the 2 in 10 dilution of blood required in this case. The resultant solution of citrated blood is then employed for grouping by the technique described above.

CROSS-GROUPING

Most of the donors reporting at the Albert Dock Hospital are of known group. If the surgeon in charge decides that there is time for the recipient to be cross-grouped, 2 c.cm. of blood is drawn from the donor, preferably from the median basilic vein of the arm which is not being used for transfusion, and placed in a tube about 8 mm. in diameter and 9 cm. long. The tube is placed at once in a small water-bath at 37° C. for 25 min. This saves time by promoting rapid clotting of the red blood corpuscles. The blood is then centrifuged for about 5 min. (A portable hand centrifuge is all that is necessary.) About 0·5 c.cm. of serum is then drawn off from the clot with a teat pipette. In the meantime a citrated solution of the recipient's blood has been obtained as described above. A drop of the donor's serum and a drop of the recipient's citrated solution of red blood corpuscles are tested on the agglutinometer for compatibility by technique as outlined above for groups A and B.

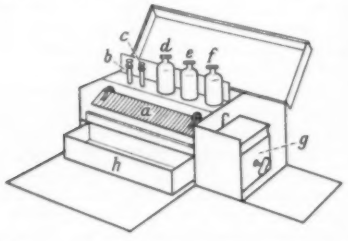


FIG. 1—Garrow's agglutinometer: (*a*) glass slab; (*b*) blood-grouping sera; (*c*) Laughlen's reagent; (*d*) citrate; (*e*) ether; (*f*) saline; (*g*) clockwork motor; (*h*) drawer to hold pipettes, cotton-wool, and needle.

TEST FOR SYPHILIS

Laughlen's reagent (Laughlen 1935) is used for the test for syphilis. It is prepared commercially in tubes containing 1 c.cm. by Lederle Inc., New York. Another tube, containing 1 c.cm. of a 10 per cent. saline solution is dispatched with every 1 c.cm. batch of antigen. For activation, 0·15 c.cm. of the 10 per cent. saline solution is added to 1 c.cm. of Laughlen's reagent, and the tube is shaken and allowed to stand for twenty-four to forty-eight hours (preferably the latter) at room temperature before being used. It is stored at room temperature and remains active for at least fourteen days. Amounts smaller than 1 c.cm. of the antigen may be activated with saline if only a few tests are being done. The inactive antigen lasts for months. A date of expiry is printed on the packing of each batch. The apparatus required consists of two 0·2 c.cm. pipettes (Kahn test pattern), a bottle containing a 0·9 per cent. saline solution; and activated Laughlen's reagent.

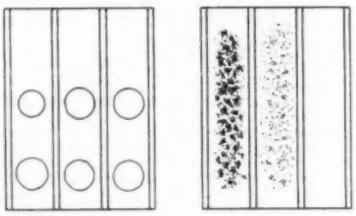


FIG. 2—Agglutinometer slab: (*a*) adjacent but separate drops before rotation; (*b*) three different results of test for syphilis after rotation: coarse floccules (strong positive); fine floccules (weak positive); and no floccules (negative).

Method.—The remainder of the donor's serum is placed in a water-bath at 63° C. for 3 min. for complement inactivation. Next, 0·2 c.cm. is drawn up into a Kahn pipette. The pipette is held vertically over the agglutinometer and lowered until the tip just touches a partition on the glass slab, and a drop of 0·013 c.cm. is delivered from the pipette. If several tests are being performed at the same time, the pipette is washed out twice with the 0·9 per cent. saline solution, and the outside of it is wiped dry with a clean cloth each time between the deliveries of drops of serum. Next, the tube containing activated Laughlen's reagent is shaken up, and 0·2 c.cm. of the reagent is drawn up into the other Kahn pipette. The pipette is held vertically as before, and drops of 0·01 c.cm. of antigen are delivered on to each partition adjacent to a drop of serum. The agglutinometer is now allowed to revolve for 5 min. If any drops are not mingling on any one partition after 30 sec. of rotation, the skin-puncture needle may be drawn rapidly across the two drops to effect contact and rotation continued. After 5 min. of rotation the slab is taken out of the agglutinometer, held horizontally, and examined for red floccules, as in blood-grouping. Then the slab is replaced and allowed to rotate again up to a total time of 9 min. from the start of the test, after which the slab is again removed and examined. Coarse red flocculi indicate a strongly positive reaction, and fine flocculi indicate a weak or doubtful syphilis reaction. If possible, it is desirable to use controls of known positive and negative sera.

Results obtained with the Laughlen reaction on 400 sera with this technique agreed within 98 per

cent. with the Kahn test (Walters 1939). Laughlen (1935) found the reaction to be 99 per cent. in agreement with the Kahn test, and Robinson and Stroud (1937) found 97 per cent. agreement with the Kahn test in 1000 sera tested. The Laughlen reaction may be considered a useful general rapid test for syphilis, subject to later confirmation by the Kahn test in all sera giving a doubtful positive result.

SUMMARY

A rapid technique for blood-grouping is described which can be carried out under almost any conditions; and a rapid method of cross-agglutination and syphilis test for donor is given.

My thanks are due to Dr. H. M. Hanschell, director of the V.D. clinic, and to Mr. H. E. Griffiths, director of the fracture clinic, of the Albert Dock Hospital, for permission to publish this paper.

REFERENCES

Garrow, R. P. (1917) *J.R. Army med. Cps*, **28**, 566.
Laughlen, G. S. (1935) *Canad. med. Ass. J.* **33**, 179.
Manson-Bahr, P. H. (1935) in Manson's Tropical Diseases, 10th ed., London, p. 552.
Robinson, F. H., and Stroud, G. M. (1937) *J. Amer. med. Ass.* **108**, 1170.
Walters, A. H. (1939) *Brit. J. vener. Dis.* **15**, 228.

Clinical and Laboratory Notes

ESTIMATION OF SULFAPYRIDINE (M. & B. 693)

BY H. H. VAN DER ZOO DE JONG, Ph.D.
(From the Medical Department of the University Hospital, Groningen, Holland)

DURING the administration of sulfapyridine frequent quantitative estimations of the drug in the body-fluids are necessary for control, and a rapid method for estimating its concentration is therefore desirable. The method here proposed is a modification of that put forward by Marshall, Kendall Emerson and Cutting (1937). It allows many estimations to be done with small quantities of material in a short time.

The diazotisation of sulfapyridine has been shown to take place rapidly in an aqueous acid solution and not in an alcoholic acid solution. Traces of sodium nitrite suffice, while larger quantities may prove deleterious, especially with low concentrations of sulfapyridine. The addition of dimethyl α-naphthylamine, however, leads in a 70 per cent. alcohol solution to a very rapid development of the colour, and the colour develops slower with lower alcoholic concentration. The red-violet colour produced is compared with a standard aqueous solution of phenol-sulphonephthalein containing added sodium phosphate. The comparison may be done in any of the usual models of colorimeter. The total sulfapyridine can be estimated in the same manner if the solution contains 10 per cent. trichloracetic acid and is heated in a boiling water bath for half an hour. The procedure is as follows.

First 1 c.cm. of serum or other body-fluid is mixed with 2 c.cm. of distilled water; then 1 c.cm. of 20 per cent. trichloracetic acid (20 g. trichloracetic acid dissolved in 80 c.cm. water) is added drop by drop with shaking. After standing for five minutes the liquid is centrifuged or filtered through a small dry filter. To 1 c.cm. of the filtrate is added 0·1 c.cm. (two drops) of a 0·15 per cent. solution of sodium nitrite. After two minutes 3 c.cm. of a 0·1 per cent. solution of dimethyl α-naphthylamine in 95 per cent. alcohol is added and the whole mixed by shaking. After standing for five to ten minutes the colour is compared with the standard. If the colour is much stronger than the standard the liquid must be diluted with the solution of dimethyl α-naphthylamine.

By precipitating the proteins in serum by a dilution of 1 : 4, as above, we recovered 94 per cent. of added sulfapyridine at a concentration of 5–10 mg. per cent., and 100 per cent. at a lower concentration. The standard is made up from a stock solution prepared as follows.

Dissolve exactly 20 mg. of phenol red and about 1 g. of disodium hydrogen phosphate ($Na_2HPO_4{\cdot}2H_2O$) in distilled water and make the solution up to 100 c.cm. The standard for use is made by dissolving about 1 g. of disodium hydrogen phosphate in water, adding 5·6 c.cm. of the stock solution and diluting it to 100 c.cm.

The standard corresponds to a concentration of sulfapyridine of 10 mg. per cent., or 2·5 mg. per cent. without diluting four times. It is advisable to control the standard at the beginning and at intervals with an acidified sulfapyridine solution of known strength. It is possible to use the same procedure as a micro-method by reducing the quantities of the different solutions. The free sulfapyridine in the filtrate is determined in this way. To determine the total sulfapyridine the process is as follows.

Dilute in a graduated tube 1 c.cm. of trichloracetic filtrate with half its volume of 20 per cent. trichloracetic acid (non-protein fluids with an equal volume) and heat the tube in a flask with boiling water for half an hour. After cooling adjust the volume to 1·5 c.cm. with water: then add 0·15 c.cm. (3 drops) of 0·15 per cent. sodium nitrite solution and after two minutes 4·5 c.cm. of dimethyl α-naphthylamine. The colour can be compared after five or ten minutes. The result must be multiplied by 1·5.

REFERENCE

Marshall, E. K., Cutting, W. C., and Emerson, K. (1937) *J. Amer. Med. Assoc.* **108**, 953.

ARCUS LIPOIDES OF THE EAR-DRUM

BY J. BERBERICH, M.D.
FORMERLY PROFESSOR FOR EAR, NOSE, AND THROAT AT FRANKFORT-ON-MAIN

FROM the middle of last century it has been known, through the investigations of Canton (1851), Virchow (1852), and His (1856), that an opacity consisting of pathological deposits of "fat" often develops in the cornea near the margin of the iris. This opacity, being found mainly in elderly people, was called arcus senilis corneæ. It was soon shown, however, to develop sometimes in younger people: persons under 30 (De Lieto-Vollaro 1910) and children (Attias 1912, Joël 1924, Versé 1925, and Rohrschneider 1925). Since there was no difference between the morbid histology of the arcus senilis and that of the arcus juvenilis, Versé rightly suggested that both of them should be called the arcus lipoides corneæ: he based his conclusion principally on the results of experiments on animals. All who systematically search for the arcus lipoides in hospitals are bound to admit that this change is seen far more frequently than one might at first suppose, and, above all, that it is by no means only a sign of old age. When the arcus is not macroscopically recognisable it can sometimes be demonstrated with the slit-lamp microscope, with which it is most interesting to follow the increasing deposition of lipoid in the cornea.

The relation of the arcus lipoides corneæ to disturbances in the metabolism of fat and lipoids is already well known to the ophthalmologist. On the other hand, the relation between metabolism and diseases of the ear, throat, and nose is not so well known. Few authors have investigated this problem, and so far they have not succeeded in establishing the relation between ear-diseases and changes in metabolism. For fourteen years I have studied this subject (Berberich 1925a, 1925b); my findings have been confirmed by a few investigators, who have accepted their significance, but so far they are not generally recognised as facts by all ear specialists and specialists for internal diseases. For these reasons, after many years of experience, I mention here some of my conclusions.

Lucae (1864) demonstrated the presence of droplets of fat in a fresh specimen of the ear-drum, without being able to explain it; he assumed that it was a local fatty degeneration. It is only in recent years that the examination of the ear-drum, magnified twenty or thirty times, has been possible with the aural microscope. For histological examination the petrosal bone has to be decalcified, and this, together with the usual celloidin embedding, makes a proper examination of the fats practically impossible. Only when gelatin was substituted for celloidin was it possible to demonstrate with stains the presence of fat in the petrosal bone.

In research on the metabolism of the blood-serum and urine and on basal metabolism I studied the arcus lipoides of the cornea and, like other authors, was able to demonstrate a hypercholesterolæmia when the arcus was present. Examining the ear-drums of these patients I detected similar changes, which I reported (Berberich 1925b): a semilunar greyish-white ring above, parallel to, and about ½–1 mm. away from the limbus (where the drum is attached to the bony wall of the auditory canal), towards the centre of the drum, but easily distinguished from the drum. Towards the periphery of the drum this silvery greyish-white ring is sharply demarcated; towards the centre, however, its outline is often indistinct. This crescentic ring, which can easily be seen by simple otoscopy, usually occupies only the lower half of the ear-drum. Nevertheless, in many cases it may also be seen in the upper half, when it is usually narrower and more delicate.

Histological investigations have shown that this ring is a deposit of cholesterol and neutral fats in the substantia propria of the ear-drum—i.e., the condition is the same as in the cornea. Lipoids are deposited in the ear-drum in the immediate vicinity of the marginal network of the capillaries in the ear-drum—i.e., in an anatomical position similar to that described by Versé in the margin of the cornea. This ring-shaped opacity on the ear-drum is called the arcus lipoides myringis, because the deposit on the cornea is always present in hypercholesterolæmia, which does not depend on the patient's age, and because both opacities are histologically identical, as proved by experiments on animals. Whereas the normal ear-drum of the rabbit contains no lipoid, this substance is invariably found, in a crescentic deposit similar to that already described, in a rabbit fed on cholesterol. In more than 200 animals fed on cholesterol for other purposes it was always possible to demonstrate this condition in the ear-drum. Nakamichi (1922) has confirmed these changes.

Clinically I have observed the arcus lipoides myringis for more than ten years. The amount of lipoid deposited in the ear-drum differs in different people, and in the same person it can vary at short intervals, an observation that can also be made on the arcus lipoides corneæ. Differences in the degree of development of the arcus lipoides myringis may exist between the right and the left ear-drums. With practice and careful otoscopy it is possible to recognise early stages of the lipoid deposit in the ear-drum. The aural microscopes lately introduced will render its diagnosis much easier.

The parallelism between the arcus in the cornea and that in the ear-drum is also worth mentioning, although here too fluctuations in intensity are observed.

If irritation is caused—e.g., by spontaneous or by artificial perforation or by scar-formation—when an arcus lipoides is present on the ear-drum, greyish-white streaks can be seen leading from the arcus to the site of irritation; histologically these streaks also are lipoid deposits. Calcium can be deposited later in these lipoid foci. These changes may easily be reproduced in experimental animals; the same is true of the lipoid deposit in the cornea of the rabbit.

Finally, those diseases of the ear have to be considered in which a hypercholesterolæmia is present—i.e., those which tend to produce an arcus lipoides. I have found a hypercholesterolæmia with arcus lipoides in cases of recurrent plugs of cerumen, in many cases of deafness in older people (presbyacusia), in many cases of hyperpiesia with deafness or with noises in the ear, and in many cases of ear-disease in diabetes. I confirmed the diagnosis in all these cases by biopsy of the petrosal bone. I can therefore conclude, from my many examinations and from those of others who undertook the re-examination, that the presence of an arcus lipoides myringis and of an arcus lipoides corneæ affords sufficient evidence of hypercholesterolæmia.

SUMMARY

Analogous to the arcus lipoides cornæa, an arcus lipoides myringis is described which consists of a deposit of cholesterol, neutral fat, and fatty acids, identical with the arcus of the cornea.

The arcus lipoides is caused by hypercholesterolæmia, of which it is an infallible sign.

Thus the arcus lipoides is found in those ear-diseases which are accompanied by hypercholesterolæmia—e.g., recurrent plugs of cerumen, most cases of deafness in old age, hyperpiesia, and often diabetes.

In experimental animals these changes can be reproduced exactly by feeding them on cholesterol.

REFERENCES

Attias, G. (1912) *v. Graefes Arch. Ophthal.* **81**, 505.
Berberich, J. (1925a) *Z. Ohrenheilk.* **72**, 448.
— (1925b) *Klin. Wschr.* **4**, 2335.
Canton, E. (1851) *Lancet*, **1**, 38, 63.
De Lieto-Vollaro, (1910) *Arch. Ottalmol.* **18**, 345.
His, W. (1856) Beiträge zur normalen und pathologischen Histologie der Cornea, Basel.
Joël, E. (1924) *Klin. Wschr.* **3**, 269.
Lucae, A. (1864) *Virchows Arch.* **29**, 78.
Nakamichi, N. (1922) *Trans. Jap. path. Soc.* **12**, 106.
Rohrschneider, W. (1925) *Klin. Mbl. Augenheilk.* **74**, 93.
Versé, W. (1925) *Verh. dtsch. path. Ges.* p. 67.
Virchow, R. (1852) *Virchows Arch.* **4**, 261.

A SELF-ADHESIVE BANDAGE.—We have received from Stanning Proprietaries, Stanbrook House, 2–5, Old Bond Street, W.1, a specimen of a self-adhesive bandage, marketed by them under the name of "Stanlast." This bandage only adheres to itself and does not stick to skin or hair. It can be painlessly removed as quickly as it is applied, without leaving any adhesive substance behind. It incorporates elastic which permits freedom of movement whilst giving full support, and it is not affected by moisture or body heat. Samples of the bandage will be supplied free on request.

REVIEWS AND NOTICES OF BOOKS

Cæsarean Section, Lower Segment Operation

By C. McINTOSH MARSHALL, F.R.C.S., honorary assistant surgeon, Liverpool Maternity Hospital. Bristol: John Wright and Sons. 1939. Pp. 230. 21*s*.

THE title of this book gives little clue to its character, scope or production. The author has set down concisely, yet in full, the history of the operation, the varied technique that can be employed, together with his own impressions on the value of each method; the results that may be expected; the instruments that may be used to make the procedure easier and safer, and the anæsthetics that are advised in various circumstances. Wherever necessary the text is illustrated, and many of the really beautiful illustrations are in colour.

The book is based upon the author's experience gained from a series of 246 cases. There was no maternal mortality, and fœtal mortality was only 5 per cent. That the author upholds the lower-segment as against the classical operation under all circumstances is soon apparent. His results bear out his opinions, but he does not underrate the dangers of even this form of cæsarean section. A number of these dangers may, he believes, be reduced if detailed attention is given to technique and anæsthesia. The lessened likelihood of sepsis more than compensates for any possible additional risk when the lower route is used in a case of placenta prævia. The author answers every criticism of the operation that has come to his notice and his reasoning is impressive. The book is for the obstetrician, not the pure surgeon; it is written on the assumption that the reader knows when, and when not, to operate.

Über die integrative Natur der normalen Harnbildung

By GÖSTA EKEHORN, D.M. Stockholm. Helsingfors: Mercators Tryckeri. Pp. 1431 (3 vols.).

THIS is not a comprehensive survey of the secretion of urine as its length might lead one to suspect, but a thesis setting forth the author's personal views on the process. It is so long because of continual recapitulation and summarising, and the third volume is entirely devoted to a general survey of the conclusions arrived at in the first two. The author states that his outlook was inspired by Sir Charles Sherrington's views on the nervous system, having as its basis the concept of physiological integration. Unfortunately, the closely knit arguments necessitated the use of the German language, with which Dr. Ekehorn was more familiar than English. The value of the book lies in its lengthy discussion of the cellular mechanisms involved in the production of urine, a topic which has been neglected since the collapse of the "mechanism versus vitalism" controversy. The filtration-reabsorption theory is taken as a working basis, and creatinine is assumed to be neither secreted nor absorbed by the tubules; this postulate allows a calculation of the volume of glomerular filtrate. In actual fact, recent work shows that creatinine is probably in part secreted by the tubule cells. Nevertheless, the author's assumptions are close enough to the truth not to invalidate his main arguments. After commenting with unnecessary frequency and vigour on the deplorable state of the subject as he found it and the poor quality of much of the literature, he points out that more use might have been made of ascertained facts to clarify the way in which urine is concentrated. Physiologists have been so preoccupied with filtration and reabsorption in themselves as to forget that it is the relation between them which is important. The quantity of chloride filtered, for instance, may be high at one determination and low some minutes later, but so long as the quantity reabsorbed varies in proportion, the rate of excretion remains contant. But, whereas the quantities of the threshold substances finally excreted depend on the fractional completeness of their reabsorption from the glomerular filtrate, non-threshold substances are eliminated in proportion to the absolute amount filtered. The passive reabsorption of such substances, and the tendency of disease to break down the resistance of the tubules to them, receive detailed consideration. The innumerable factors influencing glomerular filtration are pointed out, and the fallacy of selecting a single determinant as the regulator of any process is condemned. Rather is the intensity of each process determined by an almost infinite interplay of allied and antagonistic factors, whose integration results in the delicacy, adequacy and adaptability found in renal function. Although more objective unravellings of renal activity are to be found in recent American literature, Dr. Ekehorn's book provides a welcome mental exercise, all too rare nowadays.

Transactions of the American Association of Genito-Urinary Surgeons

AT the fiftieth annual meeting of this society many interesting papers were read of which we may select two for mention.

G. F. Cahill points out that *adrenal cortical syndromes* are more often seen without any demonstrable adrenal cortical tumour than with a tumour. Adrenal syndromes more often show sexual changes towards adult masculinity in the female than towards feminisation of the male. They may also make their presence evident by advancing maturity in the young or senility in the mature. In some cases there are general metabolic changes, more particularly in the plasma, skin and fatty tissue and in the psychological status. Cahill uses X rays, after injection of air, in order to reveal the tumour. Abnormal excretion of hormonal substances in the urine seems to vary with the sexual change, and may be present whether there is a tumour or not. This excretion of hormone may be reduced by removal of the tumour, or if no tumour is present, by a partial excision of the adrenal cortex. The possibility of the existence of a hormone that is specific to adrenal tumours is also suggested. Removal of the tumour leads to symptomatic cure, but does not correct fixed anatomical changes, such as hirsutism.

In experiments on the *transplantation of endocrine tissue* W. E. Lower and Eugene Cutuly found that the tip of the ear of a rat was an excellent site for the implantation of grafts, not only because of the good blood-supply but because it is easy to watch the growth of the transplant. Over 100 grafting experiments were made by this method. All those in which adult tissue was used proved negative, but successes were attained where grafts were taken from newborn rats. Amongst other tissues transplanted were testis, prostate, seminal vesicle, pituitary, ovary, adrenal, thyroparathyroid, and pancreas. Testis grafted into the ear has not so far developed spermatogenic function but it is possible that if it is left longer than six months some activity will be noted in the seminiferous tubules. It is generally supposed that it is the thermoregulation provided by the scrotum that allows of spermatogenesis, and Lower and Cutuly suggest that the tip of the ear may provide conditions suitable for this function.

The Needs of Youth

By A. E. MORGAN, M.A., LL.D. London: Humphrey Milford, Oxford University Press. 1939. Pp. 434. 10s.

Dr. Morgan formerly principal of University College, Hull, and later vice-chancellor of McGill University, was invited by the council of King George's Jubilee Trust to inquire into the bearing of educational and industrial conditions in this country on the development of adolescent boys and girls. He has surveyed the whole problem in an impartial and scientific spirit. In pursuit of his inquiries he has journeyed to the four corners of the kingdom and visited over 150 villages and towns. This book reports his results. "After a year of travel," he writes, "I am left with two main impressions: an appreciation of the great work, public and private, paid and unpaid, which is done for the benefit of youth, and a deep sense of the vast amount that is at present left undone." Among other urgent measures, he presses strongly for a periodic medical examination for all who enter industry: "it should not be limited to those who come within the scope of the Factories Act, but should be extended to every juvenile worker." In addition to the obvious need for improving the hygienic conditions of life and work, there are, he declares, two specific conclusions that stand out in relief: "The first is that the boy and girl must not be thrown into the world of work at 14: the educational process must continue on a compulsory part-time basis until 18; and the second, that the educational process must be so organised that it fits the growing citizen, not only for work, but for the increasing problem of leisure. In the early days of industrialisation, youth was wasted as a worker; today it is in the hours of leisure that waste is proceeding at the most rapid rate."

NEW INVENTIONS

A FRAME-AND-HURDLE BEDREST

BEDRESTS will now be needed in large numbers in some institutions which are being transformed into hospitals. In order to meet this want, a simple piece of furniture has been designed, which could easily be made in large quantities by the hospital carpenters.

At the Horton Hospital, where I am working, there are two types of bed: one has a fairly high back at the head; the other, a new "Army" bed, is rather higher, and has only a low crossbar at the head and at the foot. The bedrest here described can be used with either type of bed.

Frame.—One part is a simple frame, 2 ft. 1 in. × 2 ft. 7 in., made of 3 × 1¼ in. wood, with halving joints at the corners. The space is filled in with criss-cross pieces of 2-inch webbing (25 feet in all). Across the back, 8 in. from the top, crossing the long axis, a narrow piece of wood is secured transversely by screws, projecting about an inch. This batten prevents the bedrest slipping down, when it is leant, at an angle of about 60° to the mattress, against the head of the bed. With pillows piled in front of it, the frame acts as an efficient bedrest when the bed is one which is furnished with a back (fig. 1).

Such a frame can also be placed under the mattress. Resting on the bar at the foot it will raise the legs. If the bed is one with no back, it will raise the head and shoulders. If two frames are raised by two bed blocks, placed under their adjoining edges on the side frames of the bed at about its centre, the knees

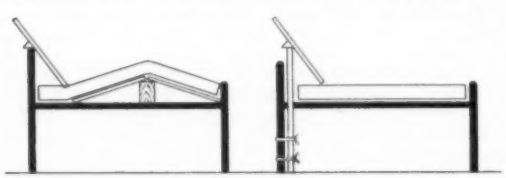


FIG. 1—Frames in situ for Fowler's position.

FIG. 3—Hurdle and frame.

can be raised; and, when combined with a third frame behind the shoulders, the patient can be placed in Fowler's position (fig. 1). The frames can also be used to give a position suitable for bronchial drainage or to provide a slope for the whole mattress. Two holes are bored in each side of a frame, through which a short cord can be passed, if it is necessary to lash the frames together.

Hurdle (fig. 2).—The other part is the "hurdle." This consists of two uprights, with a bar across the top, and one about halfway up, just above the level of the horizontal bars of the bed. The span just exceeds the width of the bed, say 2 ft. 5 in. The height is 3 ft. 10 in., and it is made of 1½ × 1¼ in. wood. These "hurdles" are for use when the bed has no back. The hurdle is placed astride the bed just in front of the bar at the head. The legs of the hurdle are lashed to the legs of the bed at the head end with the lower of the two cords attached to the "hurdle" legs. When fixed in position the "hurdle" stands firmly. The "frame" can then be leant against it (fig. 3).

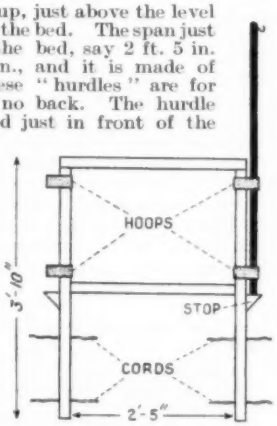


FIG. 2—Hurdle and infusion pole.

Infusion pole.—Near the top of the outer surfaces of the uprights of the hurdle on either side are two projecting loops of galvanised metal, about a foot or more apart. These can receive a small pole, like a broomstick some 3 ft. long, fitted with a hook at the top and resting, when inserted, on a little block. This pole supports, suspended from its hook, any receptacle for the administration of an infusion. The pole can be fitted on either side of the hurdle, according to which arm of the patient is used. If it is desired to administer the infusion from the foot of the bed, the hurdle can be fixed there also, for the uprights are bored for cord about 18 in. from the ground, and the four lashings will hold it fast.

As the metal loops are "staggered," that is to say, at slightly different levels on the respective sides, one can easily hinge two hurdles together by the infusion pole and improvise a clothes-horse for drying mackintosh sheeting and the like. Three hurdles with poles round the head of the bed, when draped with a sheet, will provide a bronchitis tent.

It is thought that a "frame and hurdle" bedrest such as this, which can be easily and cheaply put together, may have several useful purposes at the present time, when shortage of some supplies necessitates improvisation. With a little ingenuity, the number of uses to which it can be put is quite considerable.

TERENCE EAST, D.M. Oxfd. F.R.C.P.
PHYSICIAN I/C MEDICAL DIVISION, HORTON HOSPITAL, NO. 9 SECTOR, EMERGENCY MEDICAL SERVICE

THE LANCET

LONDON: SATURDAY, OCTOBER 14, 1939

AMPUTATIONS

AT the outbreak of the last war the amputations provided an extreme example of orthodoxy enthroned. Their description occupied many pages of the textbooks. Each bore the name of some honoured pioneer; each was described in steps that followed with the logical march of those in a proposition of Euclid. Students were taught to curtail limbs at all levels and through any joint by flaps of remarkable ingenuity. But no assessment of the relative value of these classical procedures was ever attempted, and the surgeon who would choose between the merits of several amputations or wished to know the type of limb that could be fitted afterwards, or the service it would give, could look in vain for guidance.

This didactic outlook was due to two causes: that amputations, which had formed a large part of surgical practice in the pre-Lister epoch, had almost vanished in that happy interlude between the disappearance of wound infection and the appearance of the motor-car; and that, in an age when operative surgery as a whole was growing and changing with kaleidoscopic rapidity, the amputations provided, with the ligatures of the main arteries, a group of stable and stereotyped technical procedures wherewith the anatomical knowledge and manual skill of the surgical candidate might be put to the test. Thus it came that in 1914 the surgical outlook on amputations was very much that of the Crimean war. At the same time the manufacture of artificial limbs remained a craft rather than a science. The supply was in the hands of a number of firms, most of them small; the prostheses available were, judged by modern standards, heavy, expensive, and not always efficient. Patients with well-healed stumps of reasonable length could be fitted with satisfactory apparatus, but many of the more difficult cases were obliged to do without. Moreover, owing to the difference in the products of the various firms the amputee was obliged to return to the original supplier whenever his limb needed renewal or repair.

Today, as the result of the war, and more particularly of the enlightened and progressive policy adopted by the Ministry of Pensions in dealing with limbless soldiers, the position has changed entirely. An account of the experience gained by the medical officers of the Ministry in providing artificial limbs for the 42,000 officers and men of our fighting forces who suffered amputation as the result of service is given in a handbook,[1] which has just been issued. Small as it is, this provides a comprehensive survey and will prove invaluable to the practising surgeon. One sees that the main result of these twenty years of experiment and study has been a progressive simplification of methods and of apparatus. The classical amputations have disappeared, and in their place we find a description of four ideal amputations with indications of the next best stump where the ideal is impossible. Broad principles established by repeated instances and prolonged observation replace tradition and precept. The prostheses that have been evolved during the same period show an advance equally dramatic and equally creditable to the foresight and labour that has achieved it. The modern limb is in every way better than its predecessor—lighter, stronger, simpler, more comfortable and more efficient. Further, by extended research, by the employment of new alloys, by pooling the resources and inventions of many firms, and by manufacture on a large scale, their price has been reduced while their reliability has been advanced. In place of endless gadgets we now have a few standard "set ups" round which limbs to suit any particular amputee can be constructed. As a result men can do things with artificial limbs that were previously impossible, and many, with stumps that would have been regarded a few years ago as hopeless problems, can now be fitted with apparatus that allows them, not merely to get about, but the chance of useful employment.

Where all is so valuable, it is difficult to pick any particular passage in the handbook for comment. Emphasis is once again laid on the experience of the limb fitter that long stumps are unsatisfactory; but, on the other hand, a knee disarticulation and a Syme seem to last better than an amputation in the lower fourth of the thigh or leg. To amputate at the shoulder and hip leaving the head and neck of the bone is infinitely better than to disarticulate at these joints. Amputations below the knee for thromboangiitis are almost inevitable failures. Inadequate rest in the early stages of repair will often spoil a well-made stump for subsequent use; on the other hand secondary operations such as those for nerve bulb and painful limbs are rarely justified. The Syme amputation is weighed in the balance and, on the whole, found wanting; but it is interesting to note that the average period before reamputation becomes necessary is eight to nine years. Surgeons who have seen many good Symes may be allowed to wonder whether, for the man whose limb is not supplied and kept in repair by a government service, and for him whose job may take him many weeks from a workshop, this well-tried operation may not still be performed.

This book will have a permanent influence on surgical thought and teaching. The reader is left with a profound feeling of satisfaction, not least in the concluding phrase that "from comparisons made at first hand . . . the types of limbs and appliances provided by the British Ministry of Pensions are the best obtainable in material and workmanship, finish and fit."

1. Artificial Limbs and their relation to Amputations. By Medical Officers of the Ministry of Pensions. London: H.M. Stationery Office. 1939. 3s.

RESPIRATION IN UTERO

UNTIL lately it was taught and commonly accepted that the infant does not begin to breathe until it is expelled from the uterus. A strong case, however, has now been made for the belief that respiratory movements start very early in the career of the embryo. From their observations on sheep Sir JOSEPH BARCROFT and D. H. BARRON [1] deduce that these specialised movements develop from generalised mass movements appearing early in fœtal life. At first—i.e. about the 34th day of the 147 days' gestation—they consist in a very restricted but organised reflex: contractions of the neck muscles are evoked by stimulation of a skin area just underneath the eye. During the next few days stimulation of the face will produce a general movement of the whole musculature, often not in a single spasm but in a series of spasms amounting to a rhythm. The so-called spontaneous movements appearing about the 38th day may be regarded as reflex responses to movement of the uterus transmitted through the amniotic fluid.

BARCROFT and BARRON think that these rhythmic groups of spasms, the frequency of which is about two a second or less and the duration $\frac{1}{2}$–$\frac{3}{4}$ min., are the bases of respiration (and also of other types of movement). By the 44th or 46th day little remains of the rhythmic spasms except contraction of the muscles of respiration, and any trifling somatic movement of the fœtus will initiate it. The stronger the somatic movement, the more frequent and deeper is the respiration. Meanwhile the first movement also differentiates along other lines, and on the 49th day a tap on the nose or rump will produce first "an effort to stand up," and secondly a pause, and thirdly a rhythmic respiratory discharge. By the 60th day, however, these movements have been inhibited and the fœtus becomes quiet. The inhibition may be released in three ways. The first is by asphyxia; if the umbilical cord is pinched, the series of somatic and respiratory movements is set on foot, though the connexion between the two groups becomes less close. Secondly, exposure has the same effect. And thirdly, suitable section of the brain will remove inhibition in varying ways. Experiment suggests that respiratory movement is inhibited from a centre in the upper part of the fore-brain; a longitudinal section in the middle line will liberate respiration as completely as will a transverse section. BARCROFT and BARRON conclude that respiratory movements in the fœtal sheep in the later half of pregnancy are the result of a battle between inhibition and sensation. Normally the inhibitory centre has control, but if it is weakened or abolished, or if general sensation is stimulated so strongly as to overcome it, impulses will pass from the respiratory centre to the phrenic nucleus and respiratory movements will take place.

The possible inferences relating to human respiration in utero are important. Prof. EHRHARDT [2] has lately described radiological observations which indicate that the human fœtus drinks the amniotic fluid. In a series of cases in which pregnancy had to be artificially terminated, he injected 4 c.cm. of Thorotrast into the amniotic cavity, and he found that about 15 or 18 hours afterwards most of the contrast substance had been deposited in the colon of the fœtus. This drinking function begins before the fifth month. In the course of these investigations he noted in several fœtuses that thorotrast appeared also in the lung-tissue and cast a fairly dense shadow; from which he inferred that the fœtus inspired as well as swallowed the amniotic fluid. The *Calcutta Medical Journal* for March, 1939, cites experiments by Prof. F. F. SNYDER of Johns Hopkins University in which carbon particles were demonstrated in the alveoli a minute after indian ink had been injected into the amniotic fluid. All these observations suggest that the aspiration of fluid is not an accidental consequence of labour but a normal consequence of fœtal respiration, and a means of dilating the future air-passages. When therefore a newborn child fails to breathe, the question to be asked is not what should cause the first breath, but what has interfered with existing respiratory movement.

1. Barcroft, J., and Barron, D. H., *Ergebn. Physiol.* 1939, **42**, 107.
2. Ehrhardt, K., *Münch. med. Wschr.* June 16, 1939, p. 915.

RADIUM

THE radium owned by or loaned to hospitals throughout the country would be a source of serious danger in a bombardment from the air, for according to a memorandum issued by the Radium Commission (see page 863) the blast of a high-explosive bomb exploding within 25 feet of radium containers, unless they were of especially massive construction, might burst the containers and scatter the radium in the form of dust. Such radium dust would be lethal if inhaled and would be difficult to recover, so that the area where it escaped would remain dangerous for a long period. Unfortunately most of the major radium centres are in large industrial towns, such as London, Manchester, Birmingham, Liverpool and Glasgow, where risks of air-raids are greatest. The Radium Commission and the King Edward Fund therefore advised the London hospitals and the national centres to make bore-holes into which their radium could be lowered to a depth where it would be safe even from a direct hit. This summer the holes were made, fifty feet deep and eleven inches in diameter on the artesian-well principle, and when war was declared most of the country's radium was lowered into safety. In a bore-hole, unfortunately, radium is no longer available for treatment, and although it can be replaced to a large extent by X rays, which are free from potential dangers, there remain types of cancer—more particularly in the mouth and cervix—where radium therapy is essential.

An attempt must clearly be made to reconcile the interests of the cancer patient with those of the community. There seem to be three possible ways in which this can be done. First, treatment may still be carried out in the hospitals in vulnerable areas, provision being made to lower the radium down the bore-hole on receipt of an air-raid warning. This method has been attempted at several centres and has allowed a certain number of cases to be treated, but its disadvantages are great. It

allows radium to be used only where it can be removed quickly, thus restricting treatment to surface and intracavitary applications, implantation being impossible. The time between an air-raid warning and the actual raid is doubtful, and even a well-drilled team may find difficulty in removing the radium and getting it to the bore-hole quickly enough. Trained staff must always be available, which involves not only inconvenience but some additional risk to valuable personnel. Secondly, radium in solution may be used to produce radon, the emanation plant being erected in a cavern or mine at a depth which ensures complete safety. The emanation may then be used for the treatment of patients in any hospital, such treatment involving no risk because of the short life of the emanation. This is a practical plan and radon plants are already in course of erection in suitable positions. It would, however, be difficult to meet all the needs of cancer centres with emanation. There are technical difficulties in the production and transport of the radioactive gas and in its use. With the short-lived emanation, for instance, two implantations may be needed instead of one, and its biological effects alter with its falling intensity.

Finally, the national centres in vulnerable areas may arrange for actual radium treatment to be given in safe places. In some cities whole hospitals have had to be evacuated, in others they are being used as casualty-clearing hospitals. Where the hospital which is normally responsible for radium treatment has been evacuated it will be necessary to create a complete new radiotherapy unit either in the corresponding base hospital or in a safe area suitably placed to serve the needs of the population. Where the main hospital has not been evacuated it should be possible to open a subsidiary hospital in a safe area, operated directly by the major centre. The centre should not be moved if it can be avoided because the two forms of radiotherapy cannot be divorced and outpatient facilities for diagnosis and X-ray treatment should be easily accessible to the population of a big town. Patients should then be admitted and discharged through the existing main hospitals in populous areas, where the arrangements for outpatients would continue and the usual ancillary services would be at hand, but the staff of the radiotherapy units would carry out radium treatment in a subsidiary hospital elsewhere. Privately owned radium, even where the quantity is small, must also be considered, so that the facilities of the subsidiary hospitals would have to be extended to private owners. This last is the simplest method of the three, but it cannot lightly be undertaken by hospitals already anxious about their financial position.

RETIREMENT OF A PUBLIC SERVANT

SIR FREDERICK MENZIES'S retirement was announced on Wednesday. In its fifty-years history the London County Council has had only three chief medical officers: Shirley Murphy, a reforming sanitarian; William Hamer, a scientific epidemiologist; and Frederick Menzies, a man of affairs, with great driving power and a knack of getting his own way in the large-scale problems of medical adminstration. When the opportunity of managing, controlling and bringing up to date the public hospitals of London knocked at his door, Menzies was ready for the task; he took over 76 hospitals from 26 different authorities, with a staff of 20,000, and welded them into one coherent and efficient whole. Those who knew the poor-law hospitals of a few decades ago stand amazed when they revisit them and find what improvements have been effected. But it must not be forgotten that Menzies has been not only a great hospital administrator but also a public-health pioneer. It was his hand which did all the detailed work of the London tuberculosis and venereal diseases schemes. He had however advantages not possessed by all: a commanding presence, a persuasive tongue, a facility for choosing the right assistants, personal friendships in high places, and an independence of outlook to which he was the more free to give full expression as he was not dependent on his official salary. He had had long contact with hospital problems before the municipal hospitals of London came under his control; he was for many years a governor of the London Hospital; for some years after the last war he was director of hospital and medical services for the Joint Red Cross Committee, where he obtained the knowledge and understanding of the problems of the voluntary hospitals which were so useful to him when he came to administer the complex public-health services of the metropolis.

He was much sought after as a member of government committees and gave valuable service on those dealing with midwives, venereal diseases, hospitals, and the scientific investigation of crime. He has always been the nurses' friend and has upheld their right to adequate pay and good conditions of service; he is still a member of the Interdepartmental Committee and of the General Nursing Council. He is, perhaps, at his best when receiving a deputation. With great courtesy and urbanity he hears what they have to say, asks a few pertinent questions which go to the heart of the problem—the answers sometimes strengthening, sometimes destroying their case—and sends them away feeling they have had a fair hearing and met a just arbiter.

This is a record as good as any man could wish. But there is one circumstance that must inevitably sadden what would otherwise have been a welcome release. The hospital service which should have been an abiding monument of Menzies's genius for constructive work is not at the moment the coherent whole that it was at the end of August. It is no longer functioning as a self-contained unit but is part of the London regional casualty hospital service. The internal administration of its hospitals remains with the L.C.C., but the broad structure of the service which Menzies built up has been broken. Let us hope that it will not be long before it is restored and will continue to develop on the foundations so well and truly laid. It will be the hope of Sir Frederick's admirers—and they are legion—that his health will soon recover when he is released from the strain of office and that his great talents and knowledge will find scope in some advisory capacity for the benefit of the public health.

ANNOTATIONS

PLASMA TRANSFUSION

THE *Star* of Oct. 2 gave a short account of a form of blood-transfusion in which preliminary typing is superfluous. This consists in giving plasma only. Reference was made to an announcement before the American Congress of Obstetricians and Gynecologists by Dr. J. Elliot and Dr. N. Nessett, who are quoted as saying that plasma may be stored for a year or longer and can easily be given by partly trained staff, such as stretcher-bearers, if necessary in a front-line trench. As a matter of fact, however, plasma-transfusion is no new idea, and its advantages in the treatment of shock and burns have been clearly stated by Walther.[1] Hence it would be interesting to know if any steps are being taken to conserve the plasma from blood already obtained from volunteer donors in the present emergency. This blood is unlikely to keep longer than 4–6 weeks, after which it will have become unsuitable through hæmolysis of the red cells. Thousands of volunteers have already given their blood, and it is sad to think that the greater part of this supply may be destined to be poured down the sink. An excellent opportunity now presents itself to conserve the supernatant plasma of the older samples of stored blood and to test the claims of those who advocate the use of plasma rather than whole blood in the treatment of shock.[2]

SULPHANILAMIDE IN SCARLET FEVER

THE aggression of scarlatinal streptococci against the human body is achieved by means of two distinct properties—toxin-production and invasiveness. Streptococcal toxin can be fairly readily neutralised by the use of antiscarlatinal serum, but streptococcal invasion cannot be influenced by serum, except perhaps indirectly. Hence the specific serum treatment of scarlet fever must be regarded as incomplete, and attempts have accordingly been made to supplement it by giving sulphanilamide. These attempts have not yet resulted in unanimity of opinion as to the value of the new remedy in this disease. It is clear that sulphanilamide cannot replace serum in treatment, being distinctly less effective in controlling those manifestations, due to a specific soluble exotoxin, such as rash and initial fever. But whether sulphanilamide should be employed as a routine measure remains a moot point. French,[3] thinks not. In her investigation, sulphanilamide or benzyl-sulphanilamide was given to alternate cases of scarlet fever in large doses and over a continuous period of about a month. Thus the average total dose for a child of five years of age or more was no less than 112 g. Antiscarlatinal serum was given, in addition, to cases thought to require it, irrespective of whether they were in the treated or control series. Although toxic manifestations due to the drug were common, no effect on the initial toxæmia of scarlet fever was noted, nor was there a statistically significant difference in the complication-rates between the two groups of cases. Only 1 death occurred in the combined series of 340 cases, so that no conclusion could be drawn from the fatality-rate.

French does not believe that low virulence of streptococcal strains could explain the failure of sulphanilamide in her experiment, for complication-rates generally were high. This conclusion may not be altogether justifiable, however, since individually severe complications were rather conspicuous by their absence. While admitting that the results of her investigation do not support routine administration of sulphanilamide in scarlet fever, few would at present feel justified in withholding the drug in cases where streptococcal virulence is evidently high—e.g. on the appearance of a severe complication. Statistical proof of the value of the remedy in treating severe complications as they arise may take some time to obtain, but the experience of individual clinicians suggests that it may be of a high order. Banks,[4] for example, has described a case of primary streptococcal peritonitis in scarlet fever in which rapid sterilisation of the pus was achieved by oral and parenteral administration of M. & B. 693, the patient ultimately making a good recovery.

PASTEUR

THE letters and addresses of Pasteur, which form the last volume of his collected works,[5] reveal the inner workings of his mind more than his actual experiments. He did not possess the quality popularly described as brilliance. He mistrusted mental facility and subtlety, and despised irony and scepticism. In teaching and administration, as well as in his scientific investigations, he admits that he owed his success to that infinite capacity for taking pains which has sometimes been described as the chief attribute of genius. His lectures and addresses are a constant pæan in praise of will, effort and enthusiasm, the driving forces of his life. He warned his students against considering only the practical value of scientific observations, aptly quoting Franklin—"what is the use of a new-born babe?" "Theoretical knowledge" he said, "can foster the spirit of invention, but you must submit every new idea to strict experimental control. . . . The critical faculty alone cannot produce ideas but without it no scientific work can be elaborated." Teaching he considered essential to the scientific worker, "as it constantly obliged him to review the relationship of his own particular branch to other sciences."

He attributed to Lavoisier a greater influence on modern chemistry than either of his contemporaries Scheele or Priestley, since Lavoisier methodically planned his experiments. "In the field of observation," Pasteur was wont to say, "luck will only favour those minds which are duly prepared and ready." Side by side with the shy investigator humbly deprecating his work and modestly admitting, when acknowledging international honours, "le sentiment de mon insuffisance," stalked a vastly different personality, an aggressive fighter impatient of opposition. His friends warned him against the implacable rigour of his dialectic, trying at the same time to restrain his ardour and to allay his fears that the cause of science might be imperilled through the virulent attacks of obscure tract-writers. Not content with the already large number of his adversaries, he created new ones. When his work on fermentation led him to investigate the nature of infectious diseases (incidentally proving the correctness of Robert Boyle's assertion of two centuries earlier that the study of fermentation might throw more light on

1. Walther, W. W., *Lancet*, 1937, **1**, 6.
2. See *Lancet*, Sept. 16, 1939, p. 657.
3. French, J. O., *J. Hyg., Camb.* September, 1939, p. 581.
4. Banks, H. S. *Lancet*, 1939, **1**, 983.
5. Oeuvres de Pasteur. Collected by Prof. Pasteur Vallery-Radot. Paris: Masson et Cie. Vol. 7. 1939. Pp. 666. Frs.200.

morbid processes), he encountered bitter opposition. "Do you know why I shall fight you to a finish," he wrote to Bastian in 1877, "it is because you support the view, which in my opinion is fatal to medicine, that all disease arises spontaneously within man." The physicians of that period hardly relished the incursions of an experimental chemist into clinical science, even Trousseau and Pidoux in their "Treatise on Therapeutics" of 1855 alluding to "the chemists' ambition to explain phenomena which do not even belong to the realm of chemical science."

For sheer piquancy, the juxtaposition of two such different types as those of Pasteur and Renan is perhaps unsurpassed. In 1882 Pasteur had been elected to the seat of the late Littré (of dictionary fame) at the French Academy. On these occasions the élite of Paris society foregathered to hear the panegyric of the departed immortal by the newly elected one. Pasteur did not hesitate to criticize his late friend Littré for following the positivism of Auguste Comte. "This doctrine," said Pasteur, "ignores the most positive of all notions, that of the infinite. While not denying the existence of God and the immortality of the soul, it dismisses any thought about these because science is unable to prove their existence." Ernest Renan in his reply trod more cautiously. With delightful tact and finesse, the renowned religious critic bade Pasteur welcome to this assembly: "You may appreciate meeting here representatives of diverse schools of thought, playwrights, novelists, poets, historians and philosophers. None of us, you may rest assured, Monsieur, will ever be able to shake your unalterable faith in your experiments. . . . Perhaps some day, you will admit there was some good in the prudent abstentions of Littré . . . you may learn from us, that there are such things as doubts and subtle shades of opinion. Perhaps you will allow us to come to you with our doubts and with our hesitations, giving us in return, your certainty, your assurance, and above all, Monsieur, your inestimable genius and the glory of your discoveries." Pasteur quoted from Bossuet's De la connaissance de Dieu et de soi-méme: "le plus grand dérèglement de l'esprit est de croire les choses, parce que l'on veut qu'elles soient."

THE FEEDING OF INFANTS

ACCORDING to a study made by Dr. Margaret Robinson, assistant medical officer of health for the city of Liverpool, there has been, contrary to general opinion, no decline in the last twenty years in the incidence of breast-feeding in that town, but some shortening in the period of lactation.[1] This conclusion she bases upon the case records of the Infant Welfare Centres in Liverpool which she investigated for every fourth year from 1918 to 1937. In the former year, to quote some of her results, 82 per cent. of the 294 infants for whom records were available were on the breast during their first week of life; the corresponding figure for 1937, based upon 439 records, was as high as 93 per cent. An original attempt to breast-feed is, therefore, fairly general in these records. During the fifth week, however, only 70 per cent. of those born in 1918 were still on the breast and 64 per cent. of those born in 1937. In the third month of life the comparative proportions were only 52 and 48, in the sixth month 33 and 29, and for over nine months 11 and 4. There is clearly but little difference between the figures for the two periods except for the very slightly faster rate of weaning in 1937. On the other hand it will be seen that at either period approximately one-third of these infants had ceased to be breast-fed at the end of the first month, about half by the end of three months, and only one-third were breast-fed for as long as six months, figures which can hardly be regarded as satisfactory.

It is difficult, of course, to determine how far these figures derived from mothers attending clinics are representative of the general population of mothers at the different dates. Dr. Robinson finds that they do not differ in 1937 from similar figures obtained from mothers visited in their own homes by the health visitor, and concludes that it is inaccurate to assert that clinics encourage an increase in bottle-feeding. She was unable to apply any check to the figures relating to 1918. The only alternative approach to the question would seem to lie in the direct questioning of random groups of mothers who had given birth at different times, but the resulting figures would depend upon their memories which might well be at fault, especially with regard to the duration of breast-feeding. This mode of inquiry applied in the present investigation to a hundred consecutive new cases (excluding primiparæ), who had attended the clinic since October, 1938, showed that among daughters whose own mothers had breast-fed, three-quarters of themselves had done likewise; among daughters whose mothers had not breast-fed, the corresponding proportion was just over one-half. Dr. Robinson is inclined to attribute this difference to parental influence rather than to heredity, and from a comparison of those living in apartments with those living in houses she finds a faster rate of weaning amongst the former, a feature which may be likewise due to the influence of other residents in the apartments.

The relatively rapid rate of weaning shown in these figures emphasises the importance of determining the requirements of the artificially fed child. Continuing her carefully controlled studies in this field Dr. Helen Mackay has extended her observations [2] on the health and development of infants fed on roller-process dried milk with and without a supplement of vitamin A. Her previous observations [3] suggested a higher incidence of minor infective skin lesions in the infants not receiving the extra vitamin-A supplement, and, taking the results reported by other workers into account, Dr. Mackay tentatively put forward the view that a diminished resistance to such infections might well be one of the earliest results of vitamin-A deficiency in children. In her present investigation, which lasted nearly three years and was carried out at the Queen's Hospital for Children, London, the progress of the two groups of babies, with and without the supplement, was, however, closely similar in all the points examined. Both groups showed approximately the same rate of gain in weight and the great majority of babies made good progress. The general morbidity-rate did not differ between them and showed no relative lack of resistance in the control group to illnesses of the respiratory tract, of the intestinal tract, or to specific fevers. Careful notes were taken of all lesions affecting the skin, mouth, and eyes, but these again were found to be virtually identical in their incidence on the two groups.

It seems, therefore, that the roller-process full-cream dried milk used in this investigation supplied sufficient vitamin A for the child's needs up to six months old and that the diet given at subsequent ages was equally satisfactory in this respect. It may be that the milk used in the earlier inquiry, which gave

1. *Arch. Dis. Childh.* September, 1939, p. 259.

2. *Ibid*, September, 1939, p. 245.
3. *Ibid*, 1934, **9**, 133.

the positive results referred to previously, had a lower vitamin-A content (and estimates of such contents are difficult to make with any pretence to accuracy). Dr. Mackay's conclusions are that the present results should not be taken as definitely refuting her previous findings and that, pending other evidence, it would still be advisable to give artificially fed babies a supplement providing extra vitamin A.

AIR-EMBOLISM VIA THE VAGINA

AIR-EMBOLISM is a recognised complication in obstetrics, albeit a rare one. Redfield and Bodine,[1] in reporting two examples, assert that there is a slight but distinct risk in the adoption of positions that allow air to enter the vagina in a recently delivered woman.

In their first case a woman of 33 was delivered normally of her second child, and got up on the tenth day. She was ordered to do a knee-chest exercise daily. On the eleventh postpartum day she performed the exercise and five minutes later had a convulsion, which the doctor who saw her diagnosed as eclamptic. Twelve minutes after the onset of the convulsion she died. Autopsy disclosed frothy blood in both chambers of the right side of the heart, and the lungs contained numerous large blebs of air. The uterus was filled with clot; some of the sinuses were seen on microscopical section to contain blood, while others were empty. A frothy mixture of blood and air was found in the large uterine veins, in the iliac veins and in the inferior vena cava.

The second patient was admitted to hospital with mild antepartum hæmorrhage and delivered of her seventh child by version and extraction. On the seventh day she did the knee-chest exercise for 3 minutes. On the eighth day she did the exercise for 5 minutes, then complained of feeling faint, went into convulsions and died. Postmortem appearances were similar to those found in the first patient, but more pronounced; all veins except those of the portal system were distended with air and frothy blood, and in the right heart and pulmonary artery the air was under considerable pressure, escaping with an audible hiss when the artery was incised.

The mechanism of air-embolism occurring in these circumstances is thought by Redfield and Bodine to be as follows: In the knee-chest position the labia are separated and air flows into the vagina or even into the uterus; when the posture is relaxed and the labia come together air is forced with a bellows action into the open uterine sinuses. Their conclusion is that knee-chest exercises should be avoided at least during the early weeks of the puerperium.

CARBON-MONOXIDE OR FOOD-POISONING?

As a result of researches conducted at the Paris prefecture of police, Professor Tanon and Dr. Neveu[2] have reached the conclusion that certain stormy incidents hitherto regarded as examples of acute food-poisoning must really be interpreted as the outcome of CO-poisoning. The type of case is that of the person who dines well either at home or at a restaurant. After plentiful libations and conversational prodigies he retires to rest in an ill-ventilated room heated by a stove. In a temporarily plethoric state and confronted by a prolonged and laborious feat of digestion, he is unable to obtain all the oxygen he needs for his processes of combustion, breathing as he does a mixture of air in which there is a goodly proportion of carbon monoxide. Ordinarily the poisoning would not be noticed, or its slight manifestations would be attributed to some other cause. But the alcohol circulating in the blood helps to fix the CO in it, and hypo-oxygenation and bulbar intoxication combine to produce a reaction indistinguishable from that of gastro-enteritis due to other causes. Among the incidents recorded in this note is one concerning a family which, on the occasion of a baptism, took a large meal at a restaurant. During the following night the father, mother and one of the three children suffered from headache, fever, vomiting and diarrhœa. The doctor who was summoned diagnosed food-poisoning. The father was ill for a couple of days, and the mother and her child for three or four days, after which all was well again. A formal complaint having been lodged against the owner of the restaurant, an investigation was set on foot. The stools of the diners and what was left of the food of which they had partaken were examined. No bacteriological or serological evidence in support of an acute gastro-intestinal infection could be obtained, and it was noteworthy that certain other persons who had dined at the same restaurant on the same occasion and on the same food had remained perfectly well. Copper poisoning could also be excluded. But the home to which the family had retired after dining out proved to be most ineffectively ventilated, and it was found that the air of the room heated by a stove contained 0·2 per cent. carbon monoxide. After giving an account of similar cases the authors of this note suggest that in the past many a case of CO-poisoning has been overlooked, the blame for a gastro-intestinal crisis having been wrongly put on some article of food.

PARATHYROID GLANDS AND RENAL DISEASE

PERSISTENT renal failure leads to hypertrophy of the parathyroids and a mild osteitis fibrosa. Conversely, in some cases of the osteitis fibrosa of von Recklinghausen with a parathyroid tumour the first symptoms may be caused by renal calculi or by lesions resembling those of chronic nephritis. We say "resembling" because a true toxic nephritis or Bright's disease has never been demonstrated histologically; though the symptoms may be those of chronic nephritis, the kidneys usually show deposits of calcium in the tubules and interstitial tissue and atrophy of the glomeruli and tubules caused by blockage of the tubules by calcium, together with some fibrosis and lymphocytic infiltration of the interstitial tissue—probably the result of atrophy. There is albuminuria, and there may be renal inefficiency. Chown[1] and his colleagues now report that in young rats they have produced this type of renal lesion, associated with albuminuria, by the injection of parathyroid hormone. They found that tubular dilatation, caused by incomplete obstruction of the tubules by calcium, sometimes led to the formation of numerous small cysts visible to the naked eye. They also produced, but less frequently, similar lesions of the kidney by treating rats with large doses of non-toxic vitamin D. They regard their experimental "nephritis" as identical with the phosphate nephritis of Duguid[2] and say that the deposition of calcium in the kidneys is not simply due to the increased urinary excretion of calcium. They suggest that the degree of dehydration may largely account for the variation of the lesions, which are not proportionate to the amount of parathyroid hormone

1. Redfield, R. L., and Bodine, H. R., *J. Amer. med. Ass.* Aug. 19, 1939, p. 671.
2. Tanon, L., and Neveu, R., *Mouvem. Sanit.* 1939, No. 180, p. 209.

1. Chown, B., Lee, M., Teal, J., and Currie, R., *J. Path. Bact.* September, 1939, p. 273.
2. Duguid, J., *Proc. R. Soc. Med.* 1933–34, **27**, 792.

given. It is perhaps unfortunate that the term "nephritis" is used for the conditions observed, for they do not resemble those of true toxic nephritis or Bright's disease. They are more like those of ischæmic nephritis, but due to tubular rather than vascular occlusion. The same workers also describe a less common and striking change found usually only after heavy doses of parathyroid hormone—namely, necrosis of the tubular epithelium with or without associated deposits of calcium. This has also been seen in acute hyperparathyroidism in man and dog and may play a part in the causation of the renal atrophy and the symptoms of renal failure.

ABSORPTION AND EXCRETION OF IRON

ALTHOUGH iron has long been one of the great standbys of physicians, the physiology of the metal is not a subject on which physiologists and biochemists have had much to congratulate themselves. Despite pioneer work in the last century the whole question of the absorption, transportation and excretion of iron remained obscure until a year or two ago. An important advance was made when Brock [1] and Fowler and Barer [2] discovered that quite large amounts of iron were absorbed from the intestine when large doses were given by mouth. The amounts absorbed by anæmic persons, for instance, were far in excess of those required for the restoration of a normal hæmoglobin. Writing in 1937 McCance and Widdowson [3] pointed out that "in spite of the confusion about the amount and state of iron in the plasma, it is natural to suppose that the plasma is the medium for the transport of iron." They also pointed out that the evidence at that time suggested that iron is not excreted freely, if at all, by human beings, and that therefore the amount in the body must be regulated by controlled absorption.

Since that date McCance and Widdowson [4] have themselves demonstrated in various ways the failure of the body to excrete iron, and Hahn et al,[5] using radio-active iron, have produced direct evidence that the "need of the body for iron in some manner determines the absorption of this element." These are revolutionary notions in physiology, but they do explain much that has been up till now obscure. Since 1937 Moore and his assistants have been investigating the metabolism of iron by means of serum-iron determinations, and have shown that the various anæmias may have characteristic levels of serum-iron. They find [6] that the rise of serum-iron is proportional to the dose given by mouth, that gastric acidity does not influence the absorption curve of ionised ferrous salts, and that ferrous salts give higher curves than ferric salts; but if vitamin C is prescribed with the ferric salts the serum-iron response is as good as if a ferrous salt had been taken. They also find that patients with an iron-deficiency anæmia tend to absorb iron more readily at the beginning than later on in therapy, suggesting once more that absorption is controlled.

It is too soon yet to formulate anything like a complete theory of iron metabolism, but it is obvious that within the last three years physiologists have been doing their best to remove a stain from their escutcheon.

1. Brock, J. F., *Brit. med. J.* 1937, **1**, 314; Brock and Hunter, D., *Quart. J. Med.* 1937, **6**, 5.
2. Fowler, W. M., and Barer, A. P., *Arch. intern. Med.* 1937, **9**, 561.
3. McCance, R. A., and Widdowson, E. M., *Lancet*, 1937, **2**, 680.
4. McCance and Widdowson, *J. Physiol.* 1938, **94**, 148.
5. Hahn, P. F., Bale, W. F., Lawrence, E. O., and Whipple, G. H., *J. exper. Med.* 1939, **69**, 739.
6. Moore, C. V., Arrowsmith, W. R., Quilligan, J. F., and Read, J. T., *J. clin. Invest.* 1937, **16**, 613; Moore, Minnich, V., and Welch, J., *Ibid*, September, 1939, p. 543.

STUDENTS GROUSE

IN our correspondence columns a medical student draws attention to the financial hardship that some of his colleagues are facing owing to the combination of reduced parental incomes and the increased expenses of scattered teaching. The extra cost will fall heaviest on students in their preclinical years who normally live cheaply at home near their medical school, but now that their school has moved must pay for lodgings. The more senior students who are attached to emergency hospitals as dressers or clerks get no pay, but they receive free board and lodging either in their hospital or in billets provided by the Ministry of Health. This should more than offset any travelling expenses that they have to meet. Both preclinical and clinical students have still to pay their school fees, for the schools and the teachers must live. University authorities are considering how help can be given to those who are most seriously hit, and it is hoped that no one will give up his training because of lack of funds. Those students who complain that they are moved on too often, or are kept too long in one place, should realise that how long any clinical student stays at one hospital is for the dean of his school to decide, and should therefore argue their case with their dean and not with the Ministry's hospital organisers. They might also remember that the scheme for clinical teaching was only designed to cover the first three months of the war, and that the arrangements will be reviewed by all the schools in the next few weeks.

ASPIRIN HÆMATEMESIS

THERE have been several reports on the harm that can be done by aspirin (acetyl-salicylic acid) used in excess. Sir Arthur Hurst and Dr. Lintott [1] now relate a case of hæmatemesis which they ascribe to this drug, taken in large doses over some twenty years for the relief of migrainous headaches. The patient suffered from gastric bleedings and melæna with resulting anæmia, but there was no radioscopic evidence of ulcer. The suspicion that aspirin might be the cause of the disability was confirmed when gastroscopic examinations were made: some of these are illustrated in Hurst and Lintott's report and show fragments of aspirin tablets at the centre of congested and even hæmorrhagic areas of mucous membrane. It has long been known that aspirin is capable of causing digestive disturbance and melæna, and its irritant properties have been demonstrated with the gastroscope by Douthwaite and Lintott [2] who recommended the use of calcium acetyl-salicylate rather than the usual preparation. It is thought that in the present case the patient was exceptionally sensitive to the drug. Since avoiding it he has had no further symptoms.

WE have already indicated that owing to the strain imposed on the medical services of the country by the war the utmost economy is necessary in the prescription of drugs. At the invitation of the Ministry of Health the Medical Research Council has formed a therapeutic requirements subcommittee to advise the Ministry and the medical and pharmaceutical professions on methods relating to economy in the use of drugs. Communications should be addressed to Dr. C. H. Hampshire, 44, Hallam Street, London, W.1.

Lord HORDER has accepted the appointment of honorary consulting physician to the Ministry of Pensions.

1. Hurst, A., and Lintott, G. A. M., *Guy's Hosp. Rep.* 1939, **89**, 173.
2. Douthwaite, A. H., and Lintott, *Lancet*, 1938, **2**, 1222.

THE NEW ENDOCRINOLOGY

A series of articles by Prof. E. C. DODDS, F.R.C.P., *director of the Courtauld institute of biochemistry at the Middlesex Hospital, based on lectures delivered at the British Postgraduate Medical School*

II—CHEMISTRY OF THE STEROLS

BEFORE the chemical configuration of the sex hormones can be appreciated it will be necessary to discuss in some detail advances in the chemistry of the sterols. Unfortunately the terminology of this subject is not at all easily intelligible, and the medical reader who wishes to unravel the complexities is unlikely to find in any textbook on chemistry a simple account of the system used. The following is an attempt to describe very briefly the current methods of nomenclature.

The sterols include such bodies as cholesterol, and have always been of interest to the chemist and the biochemist. They are known to contain hydrogen, carbon and oxygen, to be soluble in organic solvents, and to share some of the other characteristics of fats. Quite early, however, it became apparent that they are much more complex than simple fats. The present view of their structure is mainly due to the

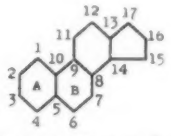


FIG. 1—Scheme for cyclopentenophenanthrene system

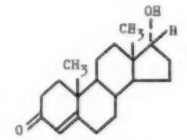


FIG. 2—Testosterone

work of the school of organic chemistry at Göttingen under Professor Windaus, but very important contributions have also been made by the English school, more particularly by O. Rosenheim and H. King. The present view is that sterols such as cholesterol, the phytosterols and the zymosterols all have a condensed carbon-ring structure in which the rings are arranged in what is known as the cyclopentenophenanthrene system. This is indicated in fig. 1.

Carbon atoms are numbered in accordance with accepted international usage. The three great characteristics of the sterols are the hydroxyl group at carbon atom 3, the angle-methyl group at carbon atoms 10 and 13, and a long side-chain attached to carbon atom 17. Various double bonds may be present in the system, as for example between carbon atoms 4 and 5. The sex hormones consist essentially of the same cyclopentenophenanthrene structure, with the side-chain at the 17 carbon atom removed. It is possible to have alcohol groups or ketone groups at the 17 carbon atom. It is obvious from the point of view of nomenclature that some system of notation must be devised which indicates the situation of the groups and double bonds. This is done by putting the appropriate number of the carbon atom in front of the letters "ol" for an alcohol group or "on" for a ketone group. A double bond is indicated by altering the name of the parent hydrocarbon, and introducing "en" in place of "an." In some instances the letter Δ is introduced with the numbers of the carbon atoms between which the double bond is situated. Thus testosterone, for which the formula is given in fig. 2, contains a double bond between carbon atoms 4 and 5, a hydroxyl group at the 17 carbon atom, and a ketone group at the 3 carbon atom, and being a derivative of the hydrocarbon androstane is therefore in this nomenclature Δ^4-androsten-17-ol-3-one.

FIG. 5—Normal type

There are further complications that are more difficult to portray than the above. The sterols consist in the main of condensed carbon rings which are saturated. The rings of the cyclopentenophenanthrene are also lettered according to the scheme shown in fig. 1. Thus rings A and B are completely saturated, and it is possible to have two forms of the rings themselves. The differences concern what one may call the points of the rings—i.e., carbon atoms 1 and 4 and 9 and 6. These "points" cannot be on the same plane, since the four valencies of the carbon atom correspond to the points of a regular tetrahedron. Therefore the above-mentioned points may either be above the plane of the paper or below.

It is possible to have two arrangements. In one of them one set of points is above the plane of the paper and one below. In this case the rings will have the appearance of a chair, as shown in the perspective drawings (figs. 3 and 4): this is known as the trans-decalin arrangement, or more commonly as the allo- variety. In the other arrangement the points of the rings are both on the same side of the plane of the paper. The appearance then suggests that of two beds (fig. 5): this is known as the cis-decalin or normal type.

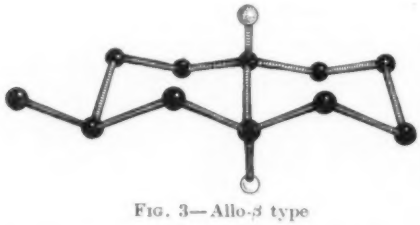


FIG. 3—Allo-β type

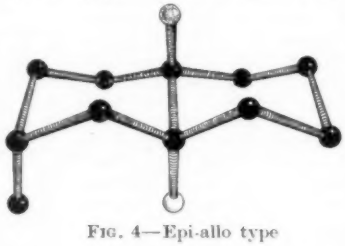


FIG. 4—Epi-allo type

There are still further complications owing to the position of the angle-methyl group in relationship to the points of the rings, the hydroxyl group at 3 and the hydrogen atom at 5. Two varieties of allo- forms can exist, and these are shown in the two perspective drawings (figs. 3 and 4). The first is the β variety,

in which it can be seen that the hydroxyl group is in the same plane as the methyl group, whilst the hydrogen is in the outside plane to both: all natural sterols are derivatives of this allo-β form. The second form, also illustrated, is known as the epi-allo-. This differs from the former in that the hydroxyl group, instead of being in the same plane as the angle-methyl group, is on the opposite side and therefore in the same plane as the hydrogen atom group at 5. It is interesting to note that all epi- compounds are not precipitated by digitonin, whilst all the β compounds are precipitated by digitonin.

It is to be hoped that, with these general instructions, the nomenclature of the sterols will be followed. The complexity of the rings is extremely great, and we have only considered here rings A and B. Stereo-isomerism can occur in the other rings, with the result that it is possible to postulate 32 isomers of œstrone. The extreme difficulty facing the organic chemist can therefore be seen, since it will be possible to synthesise a molecule having the correct formula, yet being one of the 31 unnatural isomers.

The only other stereo-isomeric problem that need concern us here is that taking place at carbon atom 17. When the alcohol group is attached to the 17 carbon atom it is possible to have two isomerides, one in which the hydroxyl group is in the same plane as the angle-methyl group on the 13 carbon atom (in which case the compound is said to be cis-), and the second in which it is in the opposite plane (in which case it is said to be trans-).

SPECIAL ARTICLES

MEDICINE AND THE LAW

Operation at Public-health Hospital

THERE was a valuable decision last week (in Nelson *v.* Cookson and another) on the liability of medical officers in hospitals maintained under the statutory powers of local authorities. The facts were not established because the preliminary legal point disposed of the plaintiff's claim. The pleadings had alleged that a girl was admitted to the West Middlesex Hospital in March, 1937, to undergo an operation for the removal of her tonsils and adenoids. One of the two defendants, an assistant medical officer at the hospital, performed the operation; the second defendant acted as his anæsthetist. The girl's case was that her left cheek was burnt by reason of the defendant's negligence in placing a gag on her face without taking precautions to see that its temperature was correct. She claimed damages for the pain and disfigurement which was attributed to the burning.

The forensic strategy of the case was interesting. No claim was made against the county council responsible for the conduct of the hospital. It was conceded (on the principle of Hillyer *v.* St. Bartholomew's Hospital) that the local authority would not be liable for the acts of its medical staff unless it had knowingly appointed unskilled practitioners. There was another obvious defence open to the local authority—namely, the fact that the action had not been begun within six months of the alleged negligence. The plaintiff's claim was directed not at the county council, but at the medical officers. They too were entitled to plead immunity on the ground that the claim was time-barred. This was the issue in the case, though the defendants had other strings to their bow. Both of them denied negligence. The first defendant also said that it was not his duty as operating surgeon to insert the gag; this would be the duty of the second defendant; if the second defendant was guilty of negligence in this respect (which was denied), he was not acting as the servant or agent of the first defendant. The two defendants were separately represented.

The preliminary issue, decided last week, was whether section one of the Public Authorities Protection Act, 1893, applied to the two medical officers. "Any action," so runs the section, "against any person for any act done in pursuance or execution or intended execution of any Act of Parliament or of any public duty or authority, or in respect of any alleged neglect or default in the execution of any such Act, duty or authority . . . shall not lie . . . unless it is commenced within six months next after the act, neglect or default complained of." There is a well-known decision (Freeborn *v.* Leeming) which establishes that a medical officer at a local authority's hospital is entitled to the same protection under the section as the local authority itself. To circumvent the Freeborn case, it was argued on behalf of the plaintiff that the defendant doctors were not mere servants or agents directed to do a particular thing in a particular way but independent persons who acted according to their own skill and discretion—persons, in fact, who were carrying out a contractual duty with the county council. The significance of this argument lay in the knowledge that in 1905 (in T. Tilling & Co. *v.* Dick Kerr & Co.) it was held that an independent contractor, working for his own profit, was not protected by the 1893 Act when doing something which a public authority had power to do. The facts of that case concerned some raised rails which caused an accident in the course of reconstructing tram-lines for the use of electric trams. The defendant company was held to be an independent contractor, not a servant or agent of the public body, and therefore was deprived of the protection of the Act. In the case last week Mr. Justice Atkinson said he was bound by, and satisfied with, the existing legal decisions which have brought medical officers inside the cover of the statute. It had been contended that, as the county council was not responsible in law for the negligence of its medical officer, there must be a right to sue the medical officer himself. But the medical officer, if he were to be sued, must be sued within six months. The omission to bring the action in time was fatal.

Any other decision would have seemed surprising in view of the facts in the Freeborn case in 1926. There the plaintiff, injured by a motor-car, was taken to a workhouse infirmary and treated by the medical officer. In the opinion of the county-court judge the medical officer was negligent in his diagnosis and treatment. The patient remained in the infirmary till October 15, 1923; then, being dissatisfied, he left and consulted other medical advisers. They advised an operation which resulted in the permanent shortening of one leg. The plaintiff said this was due to the original negligence. He did not issue his writ till April 25, 1924—six months and ten days after he left the care of the defendant doctor. Those ten days made all the difference. The six-month period must be reckoned from the date of the negligence. If the patient ceased to be in the charge of the defendant doctor on October 15, the period must run from that date. It was immaterial, said Lord Justice Scrutton, that some damage occurred after that date which was attributable to the alleged negligence. The claim was

barred. It may be worth while to add that the Freeborn case was a strong one because the fact of negligence had been judicially established and on this point the Court of Appeal would not overrule the county-court judge. These proceedings which depend upon the application of the Public Authorities Act ignore the merits. As Mr. Justice Salter observed in Freeborn *v.* Leeming, the statute is prepared to assume the misconduct of public officers; it protects them even when they have been guilty of misconduct.

Next July Lord Maugham's new Limitation Act, 1939, based upon the review of earlier and somewhat inconsistent statutes by the Law Revision Committee, will come into force. It enlarges the six-month period of limitation of actions against public authorities and their servants into a period of twelve months. The neglects and defaults which those authorities and their staffs commit are manifold. The neglects and defaults of physicians or surgeons constitute a minute proportion of the total. It seems a little hard on the hospital doctor that the period of his exposure to attack from plaintiffs should have been doubled and that his statutory protection should thus have been cut down. So tender-hearted is Parliament towards a prospective plaintiff.

HEALTH OF THE REGULAR ARMY

A LITTLE late in the day perhaps the report on the health of the Army for 1937[1] has just appeared. Apart from its date of issue, it is a model blue-book. It is completely free from unnecessary verbiage, undigested statistics and official obliquities. In its description of the day-to-day difficulties of army medicine and hygiene, it succeeds in holding the interest. Major-General W. P. Macarthur says in his introductory letter that the rate of admissions to hospital has decreased by 1·41 per cent. compared with the previous year, while the death ratio of 1·97 per 1000 and the ratio of 6·80 per 1000 for invalids discharged are the lowest ever recorded since the Great War. Among officers the commonest cause of admission to hospitals was inflammation of the areolar tissue (boils, carbuncles and so on), while among the men, venereal diseases still head the list with influenza second. In the past twenty years there has been a steady decline in almost all diseases causing invaliding from the army, with the solitary exception of tubercle, which now heads the list; second, strangely enough, comes schizophrenia with hysteria third, both of which have increased in the year under review. Rheumatic fever is commendably low on the list, a striking testimony to the environmental hygiene of the army, when one recalls how common this disease is among the metropolitan police.

There was a rise in the incidence of venereal disease in the year under review. In the United Kingdom Commands, easily the most heavily infected was that of Northern Ireland (24·7 per 1000) with Scotland second (19·0 per 1000). The lowest was the Aldershot command (10·2 per 1000). Of the foreign commands, China headed the list with 155·1 per 1000, Jamaica was second with 103·9 per 1000, while India was only 39·9 per 1000. A prophylactic cream of 25 per cent. calomel with Dettol in a soap basis was tried out extensively in the China command, but was found to be no more effective than similar preparations, and was stopped because of complaints that it was too irritating. Great success attended the use of the sulphanilamides in therapy, the dermatological specialist at Aldershot reporting that the whole atmosphere of the gonorrhœa wards has changed, and patients, instead of being dull and troublesome, are now cheerful and anxious to get on with their treatment. The work of the army doctors for soldiers' wives and children continues. Among the wives, the commonest cause of admission to hospital was abortion (14·2 per 1000), with malaria (6·1 per 1000) second. Among the children, big tonsils (29·3 per 1000) headed the list. Among 2959 labours conducted in military families' hospitals, there were only 3 maternal deaths.

Army hygiene has stood up well to such special tests as the cholera epidemic in China associated with the Japanese invasion. In Hong-Kong, the civilian population has 440 cases in its peak week, yet there were no military cases. In Shanghai, 5 military cases occurred all due to neglect of orders forbidding the consumption of unauthorised ice-cream—the biters bit. At home, the increasing use of piped water in camps has led to difficulties in disposing of the excessive amount of sullage water, and a Hattersley's system has been tried out. Scabies has increased in all areas at home in the past two years, though no increase has occurred abroad. In spite of this, pyjamas for all soldiers have not yet been authorised, though hygienic reports have urged this repeatedly. The army milk scheme in India scored its greatest triumph during the Waziristan operations, when, in spite of a temperature of 122° F., fresh milk and fresh butter in special iced containers were delivered even to places cut off by enemy action for ordinary military traffic!

1. Published by H.M. Stationery Office. London. Pp. 145. 2*s.* 6*d.*

SCOTLAND

(FROM OUR OWN CORRESPONDENT)

SIR JAMES LEISHMAN

THE career of Sir James Leishman, who died suddenly in Edinburgh on Sept. 27, bears witness to his strength of character. Starting as a postman, he founded a successful typewriting and shorthand business, entered the Edinburgh town council and became city treasurer. While he held this appointment Mr. Lloyd George's campaign for national health insurance was reaching its climax. Sir James, always a vehement defender of the interests of the working man, was vigorous in his support of the scheme, and he played no inconsiderable part in turning the scale in its favour. At the same time he fought strenuously for the separation of Scotland from England and Wales in the administration of national health insurance, and indeed he was ever a strong supporter of Scottish self-government. With his appointment as first chairman of the Scottish National Health Insurance Commission, which possibly prevented his becoming Lord Provost of Edinburgh, there began a period of arduous toil, for on his shoulders fell the burden of the creation of the whole complex machine. He was knighted for these services in 1914. In 1928 he became the last chairman of the Local Government Board for Scotland, the forerunner of the Department of Health. When the scheme for a Highlands and Islands medical service was in preparation he sought out for himself the needs and special problems of the crofter and fisher populations and their doctors, and as a result of his efforts and

his documented evidence before the late Lord Forteviot's commission of inquiry the proposed grant for the service is said to have been doubled. It was his invariable practice, before discussing a subject in public, to acquaint himself thoroughly with all the available information about it. Hence his convictions were so well supported by facts that his opponents had a difficult task. His brusque and dogmatic manner coupled with a disconcerting habit of often being right antagonised many, but none ever doubted his sincerity of purpose. His soft heart displayed itself in many ways. He was intensely interested in education, both child and adult, and he did much to promote sports in public parks in Edinburgh. At his house facing the Meadows he kept a stock of cricket bats and balls to lend to poor boys.

PAYMENT TO HOSPITALS FOR WAR CASUALTIES

The Department of Health for Scotland announce that the Government will pay voluntary hospitals what they spend in maintaining and treating war casualties. Casualties include, in addition to persons injured by enemy action, patients who have been transferred from another hospital under the emergency hospital scheme, and unaccompanied evacuated school-children who need hospital treatment. Payments will be based on the ordinary running costs of the individual hospitals in peace-time, but if costs are actually greater the Department of Health will be sympathetic. If any hospital is so financially embarrassed that it can no longer provide the casualty service required of it, temporary financial accommodation may have to be made by the Government. For casualties treated in an outpatient department other than one used as a first-aid post the interim payment will be 2*s*. for each attendance. Pending information as to the actual running cost per bed of individual hospitals in the scheme, an interim payment of 4*s*. per night will be made for each unoccupied casualty bed, and 6*s*. for each occupied casualty bed; these payments may be adjusted later. Voluntary hospitals are to make returns showing the bed states in order to qualify for the interim payments.

CHAIRMAN OF GLASGOW ROYAL INFIRMARY

Sir James Macfarlane, LL.D., D.L., has resigned from the chairmanship of the board of managers of Glasgow Royal Infirmary. He has now completed 40 years as a manager and over 25 years as chairman. During this time the total income of the infirmary has almost quadrupled. For the last 15 years Sir James has been specially interested in the establishment of the Canniesburn Auxiliary Hospital which he first proposed in 1924. This hospital was opened nearly 2 years ago. The site on which it was erected was presented to the infirmary by Sir James and his brother. He is succeeded in the chairmanship by Mr. Charles Glen.

A.R.P. IN EDINBURGH ROYAL INFIRMARY

At the Edinburgh Royal Infirmary 60,000 sand bags have been placed in position and most windows have been protected by boarding and wire netting. It has been necessary to alter the roofs to make them more fire resisting. The blacking-out of over 10,000 windows and innumerable sky lights has been a difficult task. A large staff has been busy with paper, cloth and paint. Many of the windows have also been sprayed with a rubber solution to minimise the dangers of splintering. No longer do the patients have a pleasant view over the Meadows, and they must be content merely with translucent panes.

NORWAY

(FROM OUR OWN CORRESPONDENT)

GETTING UP SOON AFTER LAPAROTOMY

Dr. N. Backer-Gröndahl, who is in charge of the municipal hospital in Bergen, has found the demand upon his surgical wards an important factor in deciding when to let patients get up after operation. It is a pity that economics should influence surgical decisions, but there it is. Since 1937, Dr. Backer-Gröndahl has encouraged his patients who have had abdominal operations to get up as soon as they liked, and he has been surprised at the improvement in their self-confidence, and the disappearance of difficulties with micturition, the action of the bowels and so on. Most of his patients now get up on the second or third day. Most of the 435 laparotomies, which he has studied with special reference to the interval between operation and getting out of bed, were on the appendix and stomach, and 355 were done under spinal anæsthesia. About one in ten of the patients had to return to bed for a day or more, the most common cause being headache, which was, by the way, just as frequent among the patients who kept to their beds for many days. Getting up soon did not affect the incidence of thrombosis and embolism one way or the other. In the past, Dr. Backer-Gröndahl says, his patients have been liable to be overwhelmed by the atmosphere of tragedy surrounding their operation, whereas now they take it more lightheartedly, if they do not literally take up their bed and walk.

PNEUMONIA FROM MANGANESE IN SMOKE

Dr. Dagfinn Elstad has spent three or four years trying to solve the riddle of endemic pneumonia in an isolated community on the west coast of Norway. Only a generation ago, the community of Sauda, with its 1500–2000 souls, was rural and enjoyed a climate noted for its salubrious qualities. Then, in 1923, thanks to a rich supply of water-power, Sauda found itself industrialised and its population trebled, with an imposing output of alloys of iron and manganese. These alloys were obtained by electrical processes in furnaces which yielded much manganese-containing smoke. The death-rate from pneumonia soon went up by leaps and bounds. An inquiry was carried out in 1928 by the late Prof. Axel Holst, who was not satisfied that there was any causal relationship between the smoke and the pneumonia. His son, Dr. P. M. Holst, advocated in 1929 the prophylactic inoculation of the community against pneumonia, but the mass inoculations conducted every autumn since then have failed to check the endemic. Actually, the total death-rate in Sauda has been no higher than that of the country as a whole, no doubt because so many young and able-bodied workers have joined the community. But during the past 14 years nearly a third of all the deaths have been due to croupous pneumonia, whereas croupous pneumonia is responsible for only 3·65 per cent. of the total deaths in Norway. Dr. Elstad dismisses as improbable the explanation that the endemic pneumonia of Sauda is maintained by the persistence of a highly virulent type of pneumococcus in the community, for typing determinations carried out by Dr. Riddervold have failed to substantiate this view. On the other hand, it is remarkable that between 1930 and 1938 the output of manganese alloys has run parallel with the frequency of pneumonia from year to year.

GRAINS AND SCRUPLES

Under this heading appear week by week the unfettered thoughts of doctors in various occupations. Each contributor is responsible for the section for a month; his name can be seen later in the half-yearly index

FROM A POITRINAIRE

II

LAST week I was side-tracked from the intention to say something about sanatorium literature. In my palmy days—financially palmy, before I acquired a wife, a house and a family—I was a member of the Book Society and paid 7*s*. 6*d*. to 12*s*. 6*d*. a month for the pleasure of reading a more or less prescribed book. I am certain that, financial reasons apart, I should not have long continued in the circle. The slavish monotony of reading every month the same book as all my friends were reading, the dreaded expectation of having to give my criticisms of it or, worse, to listen to theirs, the amassing of books many of which I cared little about—all these things would have been too much for me. It is better to buy the books one wants to keep, and to borrow the others from the excellent municipal library. One may not thus be able to discuss the latest best-seller with one's dinner-partner but I believe the maxim of my late head-master never to buy a book until it is a year old is reasonably sound. Even on that basis I had fallen shamefully behind with my general reading and, despite the many distractions in the sanatorium, I have tried to remedy the fault.

A mere list of the books I have read in the past few months would serve no useful purpose but it may interest those who find little time for general reading to know which of these books I have added to my library. The Book Society member will doubtless jibe and jeer at our backwardness. First on the list are certain biographies—Queen Elizabeth, Prince Eugène, the two Charles's. Then I find a niche for the despised historical novel—one testy reviewer called their authors jackal-biographers, presumably because they pick off the juicy bits. Margaret Irwin's trio—"The Stranger Prince," "The Proud Servant," and "Royal Flush," preferably read in that order—take pride of place for they paint an enlightening picture of the life and happenings in the stirring days of the Stuarts. I liked her sly dig on the fly-leaf of one of them that "*none* of the characters in this book is imaginary." Next come three tales of adventure—"Gone with the Wind," "North-West Passage" and "Turning Wheels"—each in its way an epic because each has as its background a movement which profoundly affected the history of the respective countries. Reminiscences have not appealed to me with one outstanding exception—'Dodo' Benson's "As We Were" (now in the Penguins; and if you don't know what to do with old Penguins, send them to the nearest hospital). What personalities there were in these late Victorian days and how eagerly were their sayings and doings chronicled. Some of their bon-mots are still vividly in my mind; Oscar Wilde gazing at Frith's detailed painting of Derby Day and then turning to a friend to ask with bated breath "Was it really all done by hand?" Or that other Oscar, commonly known as O.B., who confronted Tennyson at a garden party and announced "I'm Browning." The great man looked at him and, thinking of R. B., fiercely replied "No! you're not."

* * *

Most of us who just missed the last war were genuinely disappointed at being deprived of a great experience which our elder brethren shared. The horrors or the glories of war or the high principles for which our country was fighting did not greatly concern us; it was the novelty, the big adventure that appealed. Perhaps it was the thought that now I should have to gather the experiences of war vicariously which set me reading war-novels. "Her Privates We," "The Spanish Farm," "No Hero this," and "War-birds" are all first-class books, but better than all these is a recently published volume called "Vainglory"—an episodic eye-witness account in bald narrative by British, French, German and other observers of various land- and sea-battles from beginning to end of the war. It is a moving story of how we magnificently muddled through and of the terribly efficient war-machine which was Germany's. Let us not under-rate that machine a second time.

The last book on my list is "The Letters of T. E. Lawrence." It was given me by my staff as part of a Christmas gift and, feeling that we'd had a surfeit of Lawrence lately, I was slow to begin reading its 900 pages. But no novel could be more fascinating and my latent dislike for Lawrence gradually gave way to a warm admiration. Despite his vanities—he was part-Irish—and his excessive sensitivity, the man had greatness in him; it is the lot only of the genius to gain distinction as soldier, statesman, writer and engineer. Yet after reading the letters, a colleague and a man of discernment (but ex-public school and Lawrence did not conform to type!) was inclined to regard him first as an advertising mountebank and later as a moral coward. I feel like asking my readers, after Syd Walker, "What do *you* think about it, chums? Send me a post-card, will you?"

Such are some of the remembered books among the many I have read during the past nine months. You will say—and I shall agree—that it is an undistinguished and rather archaic list; but at least it bears out my contention that the victim of sanatorium routine finds uplift very difficult to pursue. Gone are the high resolutions to brush up my German, to re-read the classics, to become a student of history; even "Science for the Citizen" has lain by my bedside for months and only occasionally been pecked at. The shades of Marcus Paterson will doubtless rejoice.

* * *

I had been in the sanatorium only a day or two when I was told that so-and-so was a good nurse and somebody-else wasn't so good. What is a good nurse? And I mean good in the materialistic sense that one speaks of a good motor-car. A little reflection will show that the nurse has to satisfy several critics and as many "ifs" as Kipling's hero; for the qualities which the patient admires may not be those which the sister requires and the nurse whom the doctor appreciates may be detested by her colleagues. As a patient, I like my nurse to be attentive but not fussy, cheerful but not over-talkative, sympathetic but not pitying and above all, when I'm really ill, I need a nurse who can think for me. The casual nurse is anathema to the patient who needs things done for him but hasn't the spirit to ask. Efficiency is the open-sesame to sister's heart; her nurse must concentrate on her work and be methodical and thorough; to the older generation of sisters the epitaph for a

good nurse might have been "She made a neat bed." Sister also expects the nurse to be discreet, observant and informative about the patients' progress and a good disciplinarian. The doctor demands intelligence, a working knowledge of asepsis and an uncanny anticipation of his wants, though if he be young and susceptible and she has a pretty face or figure, a stupid nurse will get away with a lot. The quality which her colleagues prize most in a nurse is loyalty—a quality which is, I fear, less common among women than among men; the sneak and the toady has few real friends. If, besides, she can avoid being bossy or catty or tactless or jealous—in other words, is a good sport—she will indeed be popular. Thoughtful, intelligent, efficient and loyal; what a paragon of virtues! Yet there are many nurses who are all of these and we are only now beginning to treat them decently.

As for a good sister, she, like a good sergeant-major, is a priceless gift from heaven; and, like good sergeant-majors, they are surprisingly numerous, particularly in the older age-groups; which makes me suspect that, unlike the poet, a good sister is made, not born. Incidentally it would be interesting to know what proportion of doctors' wives are recruited from the nursing profession. It is a good apprenticeship.

* * *

Tail-piece: The Irishman who cleans our windows was singing the *Rose of Tralee* in a clear tenor. I congratulated him on his voice. "Do ye know, doctor," he said, "I was once singing at a local concert in Ireland. When I finished, a friend o' mine said 'It's Caruso you should be with, Paddy.' 'But Caruso's dead' says I; 'Shure and I know it' says he."

PUBLIC HEALTH

Fever Beds in London

THE hospital accommodation for infectious fevers in London has been drastically reduced since war was declared. The reduction was partly justified by the evacuation of a large proportion of the population at risk, who became the responsibility of the local authorities in receiving areas. But a number of the beds in fever hospitals have been reserved for casualties, and in addition many of the most modern buildings contain so much glass which is difficult to black out and a possible source of danger from splintering that they have had to be closed. The net result is that, even with the smaller population at risk, there is difficulty in finding beds. The normal centralised organisation for dealing with notified cases of infectious disease and their removal to specific hospitals has been suspended because it was anticipated that air bombardment would make it difficult to move patients long distances by ambulance. Instead the borough medical officers of health now deal with notifications in their own areas and arrange for the admission to local hospitals of such infectious cases as need hospitalisation. This change, which seems admirable on paper, has yet to justify itself during an epidemic.

Water Sterilisation in the Field

"The provision of potable water to troops in the field remains one of the principal elements conditioning the general health of armies." This opening sentence of a paper by Colonel Médecin Sillevaerts,[1] chief of the health service of the Belgian Air Force, applies not only to armies but to the conditions in our villages, where thousands of new inhabitants are settling apparently for the duration. Even in those fortunate places which have a good supply of mains water, the possibility of their damage by enemy attack makes knowledge of easily improvised means of sterilisation of well water most valuable. Col. Sillevaerts has been experimenting on methods which can be entrusted to the soldier himself who sees an opportunity of filling his water bottle from a pond, a spring or a river and needs a simple means of making the water drinkable. The colonel evidently understands the soldier and has done his best to make his methods easy. Experiments with hypochlorites and chloramines showed that action was slow and with the sort of waters likely to be available not always complete. Dead organic matter has a chlorine demand which may greatly reduce the amount available for bactericidal action. The individual soldier cannot be expected to filter water before treatment, and even after filtration much organic matter would probably remain.

Colonel W. J. Babecki of the Polish Red Cross had found that by adding, with the sterilising agent, citric or tartaric acid—that is, by sterilising in an acid solution—turbid and strongly polluted waters could be sterilised in 15 min. This period seems to be the limit of the soldier's patience. Sillevaerts and his colleagues have elaborated a fairly definite technique. Tartaric acid is more convenient to handle than citric and it is more easily compressed into tablets if bicarbonate of soda (insufficient to neutralise) is added. The effervescence produced by liberation of carbon dioxide tends to improve the taste of the water. Chloramine-T dissolves more readily if arrowroot starch is mixed with it to aid disintegration of the tablet and to increase its bulk. The formula for sterilising 800 c.cm. of water in the aluminium gourd used by the Belgian Army is:—Tablet A (large): tartaric acid 0·4 gramme, bicarbonate of soda 0·1 gramme. Table B (small): chloramine-T 0·02 gramme, starch, q.s. The instructions for use are as follows:—Fill a well-cleaned gourd with water; introduce therein one small and one large tablet; agitate well with many inversions. The water may be consumed after half an hour. The gourd must be cleaned carefully after use.

One gathers that the acid and chlorinous water, which has a pH of about 4, has some action on the aluminium which tends to reduce the available chlorine. The previous use of the gourd for beer, wine or broth has a similar tendency. If this method—which seems good and simple—were used domestically, glass or stoneware vessels would be available.

Horse-drawn Vehicles and Summer Diarrhœa

No very elaborate statistics are required to demonstrate that the decline in mortality of infants from summer diarrhœa has been associated in this country with a reduction in the number of horse-drawn vehicles on the roads. Is this correlation merely fortuitous or is it one of cause and effect, thanks to the partial disappearance of the housefly in urban communities from lack of suitable breeding places? In a recent paper Professor Graham-Smith reviews the figures for England and Wales over the years 1901 to 1937.[2]

1. *Brux. médical*, July 7, 1939, p. 1136.

2. *J. Hyg., Camb.* Sept. 1939, p. 558.

This period, as he points out, runs almost from the birth of the motor vehicle to the elimination of the horse-drawn vehicle in towns. In 1901–05 the average annual death-date from diarrhœa and enteritis in children under 1 year of age was 25·4 per 1000 live births; in 1931–36 it was only 5·4. To this recognised correlation in the time sequence Graham-Smith adds the following observations. During the years 1901 to 1922 the course of the death-rate closely followed the course of the mean air temperature of the third quarter of the year; there were only four years in this period of time in which the fluctuations in the two curves did not correspond in their upward or downward movement. In 1905 and in 1917 the air temperatures were relatively high, but the death-rates were low; the third quarters of both these years were, however, very wet and therefore unsuitable for fly-breeding. In 1908 and in 1913 the mean air temperatures were low, but the death-rates were high; the third quarters of these years were, however, very dry and suitable for fly-breeding. Between the years 1922–37 the picture is very different. Fluctuations between hot and cold summers are no less frequent than before, but fluctuations in the death-rate are only slight—though still following the temperature curve to some degree. No epidemics occurred, although judging from the temperature curve and past experience several might have been expected. Graham-Smith's interpretation is that, through lack of breeding facilities, the urban fly population had reached so low a level by 1925 that, in spite of subsequent hot summers, it no longer had any serious influence on the dissemination of the disease. If this be a true interpretation, it is strange that the diarrhœal death-rate in infancy has declined no less in the rural parts of the country than in towns. The case against the housefly may be logically good, but even the logician could still hardly regard it as proven.

INFECTIOUS DISEASE

IN ENGLAND AND WALES DURING THE WEEK ENDED SEPT. 23, 1939

Notifications.—The following cases of infectious disease were notified during the week: Smallpox, 0; scarlet fever, 1146; diphtheria, 889; enteric fever, 71; pneumonia (primary or influenzal), 300; puerperal pyrexia, 156; cerebro-spinal fever, 10; poliomyelitis, 38; polio-encephalitis, 2; encephalitis lethargica, 6; relapsing fever (Stockport), 1; continued fever (Paddington), 1; dysentery, 22; ophthalmia neonatorum, 63. No case of cholera, plague, or typhus fever was notified during the week.

Deaths.—In 126 great towns, including London, there was no death from smallpox or measles, 1 (1) from enteric fever, 2 (0) from scarlet fever, 12 (3) from whooping-cough, 18 (0) from diphtheria, 54 (4) from diarrhœa and enteritis under two years, and 4 (1) from influenza. The figures in parentheses are those for London itself.

Doncaster and Salford each reported 2 deaths from whooping-cough. Fatal cases of diphtheria were scattered over 14 great towns, Liverpool reporting 3, Stockport and Birmingham each 2. Nottingham had 6 deaths from diarrhœa, Liverpool and Middlesbrough each 5.

WEEK ENDED SEPT. 30, 1939

Notifications.—The following cases of infectious disease were notified during the week: Smallpox, 0; scarlet fever, 1163; diphtheria, 904; enteric fever, 68; pneumonia (primary or influenzal), 312; puerperal pyrexia, 162; cerebrospinal fever, 19; poliomyelitis, 43; polio-encephalitis, 4; encephalitis lethargica, 4; dysentery, 23; ophthalmia neonatorum, 66. No case of cholera, plague, or typhus fever was notified during the week.

Deaths.—In 126 great towns, including London, there was no death from smallpox, 2 (0) from enteric fever, 1 (0) from measles, 2 (0) from scarlet fever, 9 (2) from whooping-cough, 16 (0) from diphtheria, 55 (8) from diarrhœa and enteritis under two years, and 17 (3) from influenza. The figures in parentheses are those for London itself.

Blackpool and Liverpool reported deaths from typhoid. Fatal cases of diphtheria were scattered over 12 great towns, Chester reporting 3, Liverpool and St. Helens each 2. Liverpool had 6 deaths from diarrhœa, Sunderland and Cardiff each 3.

. . . . IN ENGLAND—NOW

ON Sept. 3, in a room of our new medical school, the secretary of the university, the dean of the faculty and I listened to Birmingham's first Prime Minister telling us on the wireless that for the second time in our lives Britain and Germany were at war. We looked out from this room to see our beautiful new hospital opened only a year ago being barricaded with sandbags by medical students working like navvies, some clad only in shorts, revealing brown-tanned chests and backs. When the medical history of this war is written I hope something will be said of the work of the medical students. The Minister of Health remarked recently that he could not believe that they wished to profit by the circumstances of war. They certainly do not, and in point of fact they are losing, not profiting. They have paid fees for a medical education which has been suddenly interfered with, and few of our students are affluent. When air-raids begin, they will be doing work perhaps more valuable than the salaried first-aid workers. If the Government cannot see its way to reward them on a cash basis, a couple of extra units of petrol a month might prove very acceptable.

There seems some connexion between abortive air-raids and human abortion; a false air-raid warning the other day produced four emergency calls for one obstetrician alone. Possibly a knowledge of these incidents has led the authorities to construct an air-raid shelter in the cellar under the consulting-room of our leading gynæcologist. This gynæcologist has already earned fame because the Ministry of Health proposes to pay him as a general practitioner. There is considerable indignation here because quite a number of well-established consultants have been offered the lower rate of pay in direct contradiction to the published regulations of the service.

For medical as for civil defence purposes England has been divided up into regions. The Midland region consists of five counties, Warwick, Worcester, Hereford, Stafford and Shropshire, under the control of a hospital officer (Colonel A. B. Ward, C.B.E., D.S.O.), assisted by five group officers. Birmingham, West Bromwich and Smethwick, with affiliated towns containing base hospitals, form the largest group in the area, and probably in England, since it is larger than any of the London sectors. The emergency hospital organisation in the Birmingham group differs fundamentally from that in London; whereas in London the Minister of Health has cut down the number of beds to 200 in the large teaching hospitals and transferred their equipment to advanced base hospitals, in Birmingham he has increased the number of beds in the central hospitals. Thus the General Hospital which has 480 beds in peace-time was scheduled to increase to 1200 beds in war-time. The reason for this differentiation is the absence of potential advanced base hospitals. The base hospitals are situated at outlying towns such as Lichfield, Tamworth, Nuneaton, Coleshill, Alcester, Bromsgrove, Worcester, Hereford and Oswestry. These arrangements have made the allocation of medical staff a difficult one, because in addition to serving the casualty hospitals nearly all the Birmingham consultants have to lend a hand at base hospitals; actually some radiologists have to supervise work in four or five hospitals. For this reason many are complaining bitterly of the

inadequacy of the petrol rations; indeed, if others are treated as severely as I have been our Emergency Medical Service will completely break down. Several of my colleagues have already joined the ranks of the cyclists, a possible reason why quite a few have lost weight since war was declared. Another interesting change in habits is a praiseworthy attempt to cut down the laundry bill by wearing soft instead of stiff collars.

As the Children's Hospital is in an evacuation area, the number of beds for children has been cut down to 100 (it also houses 100 emergency beds for adults). Perhaps this is why a pædiatrician now acts as a group officer. Twenty-five thousand children have been evacuated from Birmingham, but quite a number have returned. In spite of this there are 110,000 elementary school-children still left in the city, and if the children under school-age and the children in West Bromwich and Smethwick are added, there must be some 200,000 in this area; yet the hospital accommodation for them has been reduced by two-thirds. One must admit that the arrangements made by the Ministry of Health for the evacuation of patients at the outbreak of war were necessary, excellent and effective; but the Ministry did not make our hospital problem easier by ordering that admissions should be limited to acute cases, and by preventing the regular evacuation of patients from casualty to base hospitals, apparently because by so doing they would become liable for the cost of transferred patients. Hospitals have now been allowed to admit patients up to their peace-time capacity, and although the Minister of Health is said always to have visualised "this reflux into the normal hospital accommodation," the fact remains that the vision was restricted to Whitehall. The embargo against sending patients from casualty to base hospitals has not even yet been lifted, but in spite of this we are striving to keep at least a third of the normal beds empty and, of course, the emergency beds. Outpatient work, although restricted, has never really ceased, but the number of patients seeking admission is still small, and corresponds with the slump in private consulting practice. Can it be that much of medical practice is a luxury and can be dispensed with in a crisis, or with income-tax at 7*s.* 6*d.* in the pound?

* * *

Since war started the University of Manchester has had active teams of sand-bagging, A.R.P., fire-fighting, and first-aid workers, headed by professors and lecturers who have taken their turn at all-night duty, sleeping in improvised quarters in the arts building, the staff house, or the gymnasium. The women who share in the work camp in their union building. A special team of men spends the night in the central tower above the topmost roofs, on the lookout for possible fires and each member takes a three-hours watch. Requests to all departments of the university to reduce expenditure can be met to some extent without difficulty in the libraries by the suspension of the subscriptions to a large number of German publications. In 1933 the number and cost of these periodicals had increased so much that the English and American Library Associations made a monetary and monitory protest, with the result that the grievance was reduced by 25 per cent. Even now the medical library alone pays more than £200 a year for German periodicals. So here is an obligatory saving to begin with. The scientific value of the contents of this literature would in any case have had to be watched now that so many of its ablest contributors publish their work in the journals of other lands.

It was a strange unreal sight to see the usually busy wards and out-patient departments of the voluntary hospitals empty and the medical and nursing staffs with nothing to do. Still, they also serve who only stand and wait. Permission to carry on as usual at half strength until occasion arises has been a great relief to the many interests affected by the Ministry's orders.

Over a hundred second and third year students from St. Mary's in London have been evacuated to Manchester. Only some of the teaching staff have accompanied them, but if any help is needed it will be afforded by their local colleagues. With an unusually large entry of our own students full-time occupation of lecture theatres and laboratories will be necessary. All teaching in the university will end at sun-down, as it is impossible to black out the windows in its many buildings and local motor-bus transport to the suburbs which students use is difficult and insufficient after dark. Clinical teaching at the hospitals has been at a standstill during the past month, but with the partial opening of the wards it has started again. It has been possible to hold the final conjoint examinations of the London Colleges at the Royal Infirmary and the St. Mary's Hospitals last week. The vivas were taken at the medical school, and some 150 students were dealt with by a London and a local examiner in each subject—pretty heavy going for two men in one week.

* * *

Measures for medical war work in Leeds have been planned with vigour and foresight. The local emergency committee, now the medical war committee, has been active for eighteen months, and early instituted subcommittees to deal with special problems. A small executive committee has met daily for an hour or more since the outbreak of war. All our pains have had their reward and I think the co-ordination of medical activities in Leeds is as good as anywhere. We have modified the B.M.A. scheme for protection of practices to meet local requirements and the success of this can be judged by the fact that the contract has been signed by 90 per cent. of our general practitioners. The response to requests for local service has been excellent, and although many doctors have had to leave the city for service elsewhere the base and casualty hospitals and the first-aid posts have secured their personnel. A large transfusion service has been formed with complete medical and nursing staff. The health committee of the city council has given great assistance to the working of this service since the emergency as well as in other directions, but there is still need of financial assistance, and it does not appear that any help from the Government can be looked for. The English people have never been lovers of organisation based on logical principles, but if in the past we have had a guiding rule in public health administration, it has been to make the central government advisory, while local government has been executive. With a vigorous team, as we have in Leeds, this works excellently, but now help is needed from the centre, and it is being withheld.

* * *

The Southern Hospital and the David Lewis Northern Hospital in Liverpool have moved out to allegedly less dangerous zones. The Northern has gone to the attractive modern buildings of the College of St. Gregory Pulv. (the real name is, of course, known only to the select 100,000 or so of Liverpool citizens who are interested); on the extensive playing fields the honorary staff can help to win the next battle of Waterloo by practising their golf shots, or even by kicking a football about. The Southern is installed, or rather is gradually installing itself, in the recently evacuated Blank Sanatorium. It must be a great blow for a hospital staff to strike its tents, and pitch them elsewhere, transferring to the new "local habitation" its own particular "name," with all that it means in team skill, equipment, and the power and means of doing for the community all and more than was done for it in the old buildings. The enormous task of changing unfamiliar bricks and mortar into a living, working hospital is being done with great cheerfulness, even though it has its moments of exasperation. Hospital doctors are impatient people who want to get on with their job of looking after the sick, and they do not take kindly to the delays of centralised administrative

authority. From what I have seen of bureaucratic administration in the last few weeks, there is a strong case for a wide devolution of executive authority to groups and individuals who are best able to undertake particular practical tasks.

How many sanatoria have been evacuated, or partly evacuated, throughout the country? Here, I understand, some 700 tuberculous patients have been sent home; the one sanatorium still working as such has 200 beds, and is already quite full. Now it is true that the Ministry of Health has defined a standard of fitness for the discharge of a patient to his home; but the fact is that hundreds of sputum-positive patients have been scattered through the community as dangerously as if an enemy bomb had made a direct hit on a store of radium. Only yesterday a colleague told me of an evacuated patient whom he had visited at his home—a municipal tenement flat with three main rooms, all very small, housing a family of eight, including four young and therefore vulnerable children. The man had fibro-caseous phthisis, with active tubercle bacilli in the sputum. Meanwhile it is almost impossible, I find, to get a patient into a sanatorium unless he can afford to go to a private one; and I find a general feeling among all but those who have been actively engaged in looking after tuberculous patients, that this is no time to be bothering overmuch with the phthisical. Even if there is a war on, need the community be quite so suicidal? I cannot help but wonder, in the light of what one must assume to be a thought-out policy, what value the administrators of "tuberculosis schemes" really put upon them. No body of practising doctors who know from first-hand experience what phthisis means in the homes of the people would be as reckless as this; for not only will many patients who are just holding their own in sanatoria fail and die when transferred to the less protected conditions of home, but they cannot help handing on the torch of their infection to their intimates.

* * *

Your Peripatetics have already noted the outbreak either of fear of or hope for the establishment of state medicine and hospitals after the war. Here, as elsewhere, these hopes and fears abound. One thing is sure, we are entering now, in medicine as in other things, into the unknown; old things are passing away. I note, however, a widespread lack of the one stimulus that would enable us to enter this "brave new world" with hope and zest—the strong sense of a medical ethos and true tradition, to which we are inevitably committed and must steadfastly defend, and without which no outward forms can have any real life. It is something deeper than any mere preference for the voluntary system or any other system. Burke said of Society—and it can be said of Medicine—"It is a spiritual community, a partnership in all science, a partnership in all art, a partnership in every virtue and in all perfection. As the ends of such a partnership cannot be obtained in many generations, it becomes a partnership not only between those who are living, but between those who are living, those who are dead, and those who are yet to be born." And in our days, as in many aspects of contemporary life, so in Medicine, there is something of a collapse of the fundamental framework of the social and cultural order. The war will drop high explosive into the organisation and practice of medicine, bringing about "the removing of those things that are shaken, . . . that those things which are not shaken may remain." It is sad that so many of us face the prospect with a flat joylessness, which is itself a measure of the cracks in our already crumbling edifice.

LETTERS TO THE EDITOR

THE ULCER PATIENT

SIR,—In your leading article of Sept. 30 you refer to the address of my friend, Professor Meulengracht, on the treatment of hæmatemesis as if he had described a new and revolutionary method of treatment. As confirmation of its value you refer to the review of 241 cases of hæmorrhage treated by Graham, Alexander and Kerr in Glasgow published in the same issue of THE LANCET. But these authors say that the improvement in their results occurred when they altered their regime "by shortening the semi-starvation period and giving the patient a diet of greater calorie value, of the type suggested by Hurst" . . . "None of those treated with the newer high-calorie intake (Hurst's diet schemes) died," compared with an earlier mortality of 9·5 per cent. They give a reference to a paper of mine published in 1931, but the diet, which they calculate has a value of 2900 calories, is the same as that described in my book on ulcer published with Stewart in 1929 and is what I have used at Guy's ever since 1919. I do not suggest that I originated it, but it is certainly not a new idea to provide an adequate amount of food and drink as soon as active bleeding has stopped—i.e., in the majority of cases after an interval of 24 hours—as this treatment has been widely used in Great Britain for at least twenty years. It is in consequence of this that the general mortality in England, as distinct from the hospital mortality, is, as Ryle and I showed in 1937, about 2 per cent., which is approximately the same as Meulengracht's (10 deaths out of 491).

We allow no food by mouth for twenty-four or forty-eight hours, during which ½ to ¾ pint of normal saline solution is given four-hourly by rectum. After that the ordinary treatment of ulcer with hourly 5 oz. feeds is instituted at once; there is no slow increase from starvation to an adequate fluid and calorie intake.

Dr. Avery Jones[1] has shown that the mortality after hæmorrhage is to a great extent due to dehydration and not, as suggested by Meulengracht, to starvation. He tells me that he thinks the great differences in the mortality statistics at different London hospitals are due to the fact that at some hospitals small feeds are given for a considerable time after the short period of strict starvation, whereas at others (such as Guy's) 5 oz. hourly feeds are given at once. The starvation for twenty-four or forty-eight hours in itself can do no harm, especially when fluid is given by rectum, but he believes that it is the withholding of an adequate quantity of fluid in the following days which is dangerous.

So far, therefore, as the avoidance of starvation and dehydration are concerned our treatment is much the same as Meulengracht's. He, however, gives cheese, slices of meat and a "variety of dishes," which I am convinced are most unsuitable for patients with an active ulcer, whether it has recently bled or not. I should regard it as very unfortunate if Meulengracht's diet were adopted in Great Britain just at a time when the treatment of ulcer has become more satisfactory than ever before. A strict diet and rest in bed, continued until all the evidence points to complete healing, followed by a lifelong post-ulcer regime is resulting in the gradual diminution in the need for surgery. Davies and Wilson's invaluable work has emphasised the importance of the psychological factor in ulcer; but, as it is impossible to prevent domestic and business worries, in practice the post-ulcer regime

1. *Brit. med. J.* 1939, 2, 332.

must consist of an easily digestible diet, regular meals with intermediate feeds, limitation of smoking, and adequate rest—all of which are possible for every patient.

I am, Sir, yours faithfully,

Oct. 6. ARTHUR F. HURST.

THE PSYCHOLOGICAL FACTOR IN HÆMATEMESIS

SIR,—There appears to be some misunderstanding of the arguments for and against the psychological causation of hæmatemesis. A knowledge of the frequency of ulcers in head injuries dates back at least as far as the eighteenth century, and Camerer [1] in 1818 published unsatisfactory experiments suggesting that the autonomic was involved. Schiff [2] placed the nervous hypothesis on a firm basis by excellent work in which he produced ulcers in the dog by interference with the midbrain. From Virchow onwards to the close of the century, continual support was forthcoming for the psychological view, and the controversy was between those who thought that mental upsets produced functional upsets and these in turn led to ulcer (Rosenbach, Strumpell), and the opposite school which held that people with weak bowels were especially liable to ulcer and mentally more irritable and unstable because of their weak bowels (Romberg, Kolk, Alt, etc.).

With the turn of the century and the growth of the doctrine of psychosomatic unity, this controversy lost its meaning. Nevertheless, we still perceive two types of ulcer with intermediate forms. Ulcers occur in tough, phlegmatic men with healthy bowel function, although they are becoming rare in England owing to changes of diet; we see them sometimes in Oxford in patients from the Cotswold area, and they are common in the Rhineland hospitals, in the South of France and parts of the Danube valley where local tradition blames new wine. But the second type of ulcer is the important one for us, the ulcer which we cannot diagnose clinically because it appears sporadically as a result or accompaniment of severe indigestion; and sometimes it seems as if the presence of an ulcer makes little difference to the severity of the indigestion. It is in this type that the emotional factor appears so important.

Dr. Davies, if I understand him aright, argues that the sequence is psychological upset→motor secretory disturbance of the stomach with formation of erosions →progressive deepening of the erosion until it reaches a blood vessel or the peritoneum→struggle in mental sphere relieved→healing of ulcer→probable negative X ray in three weeks' time→period of relief until next episode. Objections to this theory are: 1. In the experimental, animal violent and prolonged motor secretory disturbances are necessary to produce erosions and these erosions are not accompanied by the large outpourings of lymphocytes seen in most human cases of erosive gastritis. 2. There is no radiological or clinical evidence that emotional disturbance produces a gastric colic and hypersecretion comparable with that found in the pyloric syndrome, where the stomach may be exposed day and night to a stream of maximum strength gastric juice and gross hyperperistalsis. And yet in these stomachs traumatic ulcers, produced for instance by the beak of a rigid gastroscope, heal in a few days! 3. Admittedly gastric tone can't be measured directly, since the unpleasantness of swallowing a recording apparatus inhibits it. But if we estimate tone radiologically (and animal experiment shows that we can), we find hæmatemesis on the whole associated with low tone stomachs. 4. There is no evidence that ulcers are especially liable to heal in the three weeks which are usually allowed to elapse before an X-ray examination is made—i.e., ulcers are just as hard to find if the examination is made at once; and as I have already pointed out [3] there is no evidence at all that ulcers are responsible for most hæmatemeses and a little evidence that they're not. 5. The time-interval between the emotional upset and the hæmorrhage is too long. And why is it so uncommon for the first severe mental crisis to lead to trouble? And why are sensitive children with sensitive stomachs immune? If the animal experimental work has any bearing on the matter at all, some cases ought to bleed within a few hours of a "crisis." Actually chronic mental strain seems more dangerous than acute. 6. The midbrain theory doesn't account for the large number of hæmatemeses and perforations (far more than in men) which occurred in young unmarried women everywhere in N.W. Europe and the English-speaking world in the latter part of the nineteenth century and early years of the twentieth (Jennings [4]). Nor does it account for the large group with a history of recent severe constipation or abuse of aperients; or for those interesting cases who have given up aperients for years on medical advice, but who continue to show some of the severest forms of gastritis which we have ever seen, and who from time to time develop shallow ulcers which bleed, despite the fact that HCl is almost or completely absent. 7. Lastly the midbrain theory doesn't account for the superiority of proper feeding methods in the treatment of hæmatemesis. This superiority was repeatedly claimed by Lenhartz and his followers (1895–1912), and Spriggs,[5] reviewing some of the literature, thought that the case for feeding was proved. In badly treated series of hæmatemesis cases, 20–30 per cent. of deaths are due to multiple or acute lesions. If early feeding is adopted, nearly all these cases survive and the only question is whether the uncommon chronic ulcers with eroded vessels would have been saved by a form of treatment which has a lethal effect on acute lesions. (Incidentally why is the feeding treatment of hæmatemesis ascribed to clinicians who were in their nurseries when its value was first shown?)

Instead of the midbrain hypothesis, might I suggest an alternative explanation which seems to me to fit not only Dr. Davies's facts but a great many other ones as well? Unpleasant emotion or fear increases colonic tone, empties the small intestine and leads to stagnation in the stomach. May not food stagnating in the stomach irritate it? It is always so difficult in gastroenterology to know which is the cart and which the horse, but there is no doubt that delay in an *inactive* stomach and irritation are associated. And may not increased colonic tone and fermentation from undigested food drive bacteria up the small gut, make it more irritable and start the vicious circle of gastroenteritis? Hypersecretion and hyperperistalsis and the rapid emptying of the stomach would then be purposive reactions designed to restore the sterility of the upper gut, or to overcome the obstruction brought about by swelling of the pyloric mucosa. A theory of this sort would bring the psychological, dietary and gastroenterostomy inflammations into line, and I believe it could be stretched to cover the

1. Camerer, Thesis Stuttgart, 1818, cit. Andral, G.A., A Treatise on pathological Anatomy, 1831.
2. Schiff, M., *Arch. physiol. Heilk.* 1854, **13**, 30.
3. Jennings, D., *Lancet*, 1936, **2**, 1487.
4. *Ibid*, 1939, in the press.
5. Spriggs, E. I., *Quart. J. Med.* 1910, **4**, 399.

thirty odd anomalies about peptic ulcer which Alvarez says have never been answered by one theory. Furthermore, it would fit the geographical and occupational distribution of ulcers, the changes in age- and sex-distribution which have occurred, and the spontaneous and experimental ulcers in animals.

I am, Sir, yours faithfully,

Oxford, Oct. 1. DENYS JENNINGS.

POSITION OF MEDICAL STUDENTS

SIR,—Although medical students, as the Minister of Health has pointed out, "do not wish to profit by the circumstances of war," nevertheless most are dependent financially on parents who, as professional men in most cases, are particularly hard hit by the outbreak of hostilities. This leaves many of these students in the emergency medical services in the anomalous position of finding difficulty in finishing the course, necessary for qualification, purely due to lack of money. This difficulty is increased by the extra expense of travelling to "safe areas" for parts of the qualifying examination. In addition, important and responsible work is being done which would normally fall to qualified men.

Medical students are also faced by the fact that they have no form of contract with the Ministry of Health and are thus completely unprotected should any accident occur during the course of their work.

This state of affairs is surely worthy of consideration.

I am, Sir, yours faithfully,

NORMAN C. B. TRAPPS.

Westminster Hospital, S.W., Oct. 2.

EVANS' RECENT ADVANCES IN PHYSIOLOGY

SIR,—In a book in which each edition is marked by the introduction of chapters on entirely fresh topics, it is of some interest to the reader to know how much of the book deals with subjects previously treated and how much is quite new. This must be my formal excuse for seizing the opportunity for which every author longs—that of correcting his reviewer. Not three, as stated in your issue of September 30, but four of the twelve chapters in the 6th edition of "Recent Advances in Physiology" are new, the chapter on the cortical control of movement which escaped observation being, unfortunately, not the least—which received its deserts—but that unlucky enough to be placed last.

I am, Sir, yours faithfully,

University College, London, Oct. 4. W. H. NEWTON.

FREUD AND SEX

SIR,—There are occasions when it is wise to disregard the old counsel *de mortuis nihil nisi bonum*, and this is one of them. It is both appropriate and necessary to record that Freud's unhealthy obsession with sex has been responsible to an overwhelming extent for the depravity of mind and perversity of taste that has affected, among others, English people and particularly English women since the last war. In itself a sufficiently grave evil, this result has had consequences immeasurably malignant, for it undoubtedly paved the way for wide acceptance of that complete Jewish ideology out of which sprang bolshevism, nazism and the present war.

I am, Sir, yours faithfully,

Harley Street, W.1, Oct. 2. A. RUGG-GUNN.

AERIAL DISINFECTION

SIR,—I have read with interest the leading article entitled Town into Country in your issue of Sept. 9, together with the preventive measures set out on page 618. My object in writing this letter is to point out the potentialities of a preventive measure about which extremely little appears to be known even among the medical profession. I refer to air sterilisation by the use of germicidal aerosols, a subject which has apparently only been studied by Pulvertaft in this country, although it has long occupied the attention of Trillat in France.

A team of workers has been occupied here for two and a half years (during the latter half of which time the writer has been associated with the work) in investigating the possibilities of preventing infection from one individual to another. This has been attempted by means of a germicide atomised into the air, which is practically imperceptible to the senses and is harmless to those breathing the air, although at the same time it is lethal to bacteria. While we have in the main been able to verify the results obtained by the aforementioned investigators with laboratory cultures of ordinary bacteria, we have concentrated especially on the sterilisation of the bacterial flora of the salivas of normal man. In other words the air has been contaminated by artificial dissemination of fresh saliva, such air being subsequently cleansed by treatment with a germicide mist. We have not yet utilised salivas known to be contaminated with human pathogens, but meanwhile, for convenience, have substituted animal pathogens. It is, however, logical to assume that the particular micro-organisms we have used would not react differently to their human counterparts.

Although we have done a vast amount of work, we have, so far, refrained from publishing any of our results, as we felt that the knowledge we had gained should not be broadcast until we were absolutely sure of our ground. We were aware also that, by the substitution of suitable chemicals for germicides, certain workers had claimed to be able to neutralise poison war gases, and although we have done little in this direction, our observations on the physical behaviour of "mist" particles in the air should unquestionably prove of value in solving gas decontamination problems.

The fundaments of our results of rigorously controlled experiments carried out in a closed atmosphere in specially constructed chambers are briefly summarised below.

(1) With a concentration of 1 c.cm. of germicide in about 500,000,000 c.cm. of air we are able to "kill" at least 99 per cent. of atomised broth emulsions of laboratory cultures of bacteria such as *B. coli*, *C. xerosis*, and gram-positive micrococci within five minutes. With one-tenth of this concentration we may completely sterilise the air within one hour.

(2) The contact time has to be extended to 15–30 minutes, or the concentration raised, in order to obtain parallel results on the natural flora of saliva.

The possibility, or, one may say, the probability that the surviving organisms are so badly damaged that, although still capable of growth on laboratory media, they would be rendered avirulent is obvious from one's knowledge of infection and immunity. We ourselves are on the point of carrying out the necessary confirmatory experiments, but Trillat seems already to have proved this point to his satisfaction.

Finally, I am of the opinion that we are in possession of a germicide and a technical knowledge of the

best means of applying it as an aerial disinfectant, which we have every reason to believe should prove of inestimable value in preventing the spread of air-borne epidemic diseases, and I feel that our experimental unit should be utilised in a practical manner by the civil or military authorities during the present emergency.

I am, Sir, yours faithfully,

C. C. TWORT,
Director of Research.

Portslade Laboratories, Sussex, Sept. 20.

CHEMOTHERAPY OF BRONCHOPNEUMONIA

SIR,—In your leading article of Oct. 7 you ask: "What of the appalling loss of life from bronchopneumonia in early childhood?" Our experience with M. & B. 693 (*Medical Officer, Aug.* 5, 1939) strongly suggests that the saving of life in this condition by this drug is just as striking as in lobar pneumonia. Our results in whooping-cough bronchopneumonia showed a reduction of mortality of 80 per cent. compared with previous years' experience; in primary infantile bronchopneumonia there were 2 deaths in 32 cases; in all the fatal cases the patient was practically moribund on admission. The youngest patient treated was a baby of five weeks with whooping-cough and pneumonia (dose 0·08 g. four-hourly) who made a brilliant recovery.

In using this drug it is essential to give four-hourly doses. I stress this point as I find some practitioners are inclined to give it three times a day only, which means a twelve-hour interval during the night, during which time the concentration of the drug is likely to fall to a low level in the blood. The drug is much better tolerated by children, in whom nausea and vomiting is comparatively rare, compared with adults.

I am, Sir, yours faithfully,

B. A. PETERS.

Ham Green Hospital and Sanatorium, Bristol, Oct. 9.

EVACUEES AS RESEARCH MATERIAL

SIR,—We have been informed that research is to proceed in war-time. I would like to draw attention to the unique opportunity which the evacuation of town children furnishes for psychological, nutritional and sociological research, and to stress the importance of not missing such an opportunity. "Psycho-sociological" research is far too much neglected here. The journals which do exist to deal with it tend to be more concerned with speculative philosophical abstractions, than with good solid collection of facts. Nevertheless it is most important to try and determine the rôle of social factors in mental and nervous diseases (as is being done in the nutritional field). Treatment in psychiatry is generally palliative and so time consuming that its application on a wide scale will always be fraught with the greatest difficulty. On the other hand, if important sociological factors can be found, prophylactic measures become a possibility on a far wider scale. The question is interesting and controversial, as there is much evidence to show the intrinsic psychopathology of mental disorder. However it need not be contradictory. A very interesting investigation from Chicago shows that delinquency, schizophrenia, G.P.I., alcoholism and certain other psychoses—manic-depressive insanity being a notable exception—occur in the poorest zone of the city (where there is a shifting population) irrespective of race. The evidence for the co-existence of schizophrenia and delinquency is interesting as it illustrates that accepting a sociological background does not exclude the psychological factors. It seems that in a very bad environment delinquency is a sign of health. It is the aggressive individual's reaction and his aggression becomes accentuated; on the other hand, in the presence of over-aggressive companions the introverted individual tends to retreat further into himself, especially in overcrowded poor neighbourhoods where there is no escape.

The interrelationship of psychological and physiological health is another question needing investigation. In inquiries of my own I found that there seems to be a definite relationship between poor physique and nervousness in children—the war has interrupted a continuation of this inquiry as to which comes first—results which I cannot at present reconcile with other findings of mine that nervousness was less amongst poorer children than rich children; perhaps the answer among the poor was "less fussing" on the parents' part. How will "lack of parental control" affect evacuees? There are also interesting problems of physique itself on which the evacuation should throw light; is poor physique due as some contend to poor nourishment, or primarily due to lack of fresh air and sunlight? However I hope I have written enough to show that a study of the evacuees might throw light on many dark places. Once again, if research is to continue, may I urge the importance of such a study as I have suggested. If such an investigation were undertaken, it could also be made "practical" by giving psychiatric advice while the investigation was in progress.

I am, Sir, yours faithfully,

W. LINDESAY NEUSTATTER.

Department of Psychological Medicine,
Guy's Hospital, S.E.1 Oct. 7.

MEDICAL LIBRARIES

SIR,—In your issue of Sept. 23 you indicate that most of the medical libraries in London have been closed as a result of the emergency. I shall be glad if you will tell your readers that the library of the Royal Sanitary Institute has been open both for reference and lending purposes, and will continue open as long as this is possible. It will, however, be necessary to close the premises an hour before sunset during the dark part of the year to enable the staff to complete their work before the blackout period commences. The library will not be open on Saturdays.

I am, Sir, yours faithfully,

J. DUDLEY ROBINSON,
90, Buckingham Palace Road, S.W.1, Oct. 3. Secretary.

The Lancet 100 Years Ago

October 12, 1839, *p.* 93.

Specimens of Clinical Instruction, from a correspondent.

. . . We propose to give occasionally a slight sketch of the mode in which surgeons and physicians in our public hospitals instruct their pupils. We will commence with Sir Anthony Carlisle. Scene, Wards of Westminster Hospital, Oct. 6. The venerable knight passes by several beds, and looks at his patient or not, as it suits his humour. If a bandage is about to be removed, to show any disease or injury, he exclaims, "Tut man, I don't want to *see* it." . . . Mr. Lynn exhibits a patient whom he has reason to suspect has stone in the bladder, but he would not consent to be sounded. Sir Anthony speaks, "Now, friend, you'd better let us try to find a stone; sounding's nothing, man, only like putting a feather up your nose, nothing worse Besides, it's a hard matter to cure a disease when we don't know what it is; it's hard enough when we do know, but harder when we don't."

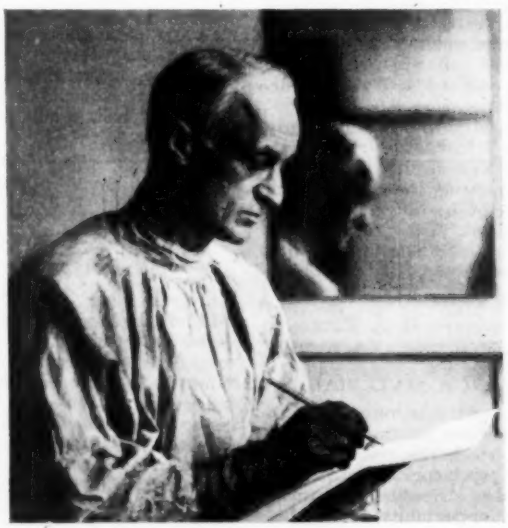
OBITUARY

HARVEY CUSHING

M.D. HARVARD, F.R.S.

Harvey Cushing died of coronary artery disease at his home in New Haven, Connecticut, on the morning of Oct. 7. Almost exactly six months before, he had been presented by his former pupils and assistants, members of the Harvey Cushing society, with a bibliography of all his writings on the occasion of his seventieth birthday. This was the last of a long series of tributes from surgical and scientific societies the world over. For Harvey Cushing was everywhere recognised as the founder of modern cerebral surgery.

Harvey was the fourth in the direct Cushing line to follow a surgical career. His father, a general practitioner in Cleveland, was elected to the chair of obstetrics and gynæcology at the local university of Western Reserve. He had nine children by his wife Betsey, and Harvey was the last. In due course, the younger Cushing went to Yale, where, in the intervals of playing baseball with enthusiasm, he came under the influence of Chittenden, the nutritional physiologist. After graduating in arts at Yale, he went on to the Harvard medical school, to take his M.D. in 1895. He worked as a surgical intern in the Massachusetts General Hospital, and he records the primitive state of neuro-surgery there at that time.



In 1896 Cushing went to the Johns Hopkins Hospital at Baltimore as junior assistant to William S. Halsted. Halsted was a scholarly, shy man, as much concerned with physiological principles as with surgical technique. As progressive refinements, he introduced rubber gloves, fine silk, and a fastidious gentleness in the handling of the tissues. This tradition of infinite care and patience was passed on by Cushing. But if Halsted meant much to Cushing, so also did Osler. Cushing lived next door to him, and between the two there grew up a warm and lasting friendship. Long afterwards, when Osler died, his wife turned to Cushing to write his memoir. Quietly and without relaxing his already full operative routine, Cushing set to work. Each morning, he wrote until ten or eleven, and in five years the great work was finished. There have been more polished and less prolix biographies, yet none have succeeded in weaving together so complete a picture of a man and his times. Cushing effaced himself entirely from the scene so that only those who knew both could tell how often he was the unnamed actor on the stage. The book was awarded the Pulitzer prize as the best biography of the year.

To return to Baltimore. Cushing was fascinated by the new X rays, and took the first radiogram at Johns Hopkins. These not only launched him on his pen-and-ink career but also turned his interest towards neurology. By chance, a case of hæmatomyelia due to a gun-shot wound of the spine came under Cushing's care, and he was able not only to locate the bullet with the X rays but also to follow the gradual disappearance of anæsthesia and pareses. His pictures were taken with a "decrepit and perverse static machine, as big as a hurdy-gurdy and operated in the same way—by turning a crank."

Then, in 1900, he crossed the Atlantic with Osler to see European experimental neurology. Horsley he found so busy that only his evenings at home could be given to research. In Switzerland, he worked for a year with Kronecker and Kocher. Here he demonstrated that a rise in intracranial pressure results in a rise in systematic blood-pressure. He next migrated to Mosso's laboratory at Turin, then on to Sherrington and Grünbaum at Liverpool, where he assisted in the experimental delineation of the motor cortex in apes. His equipment as a neurosurgeon was so far entirely experimental. When he returned to Baltimore in 1901 he petitioned for a post as neurosurgeon at the clinic. His chief was staggered, and suggested orthopædics as an alternative, covering all the surgical aspects of neurology. Cushing was not abashed, but continued to do general surgery, and soon the neurological patients began to come. From 1901 to 1912 he worked at Baltimore, in the hospital and in the Hunterian laboratory. He was satisfied with nothing short of perfection in each surgical procedure. At first, most of the cranial operations were miserable failures. But he persevered, and gradually successes came.

At this time he developed and described the operation for subtemporal decompression. To perfect cerebral hæmostasis he devised a clamp to apply a small silver clip to bleeding vessels. Most important of all, he found that in the closure of the scalp the galea or deeper fascial layer must be carefully sutured separately to prevent the leakage of cerebrospinal fluid. Like Halsted, he was much concerned with physiology. He observed the "weeping" of the human choroid plexus in the opened ventricle, though it was left to his pupil Weed to complete our knowledge of the circulation of the cerebrospinal fluid. He charted the sensory as well as the motor areas of the cortex in patients, under local anæsthesia. And he began his studies on the physiology of the pituitary, which culminated in his description of the basophil adenoma with its associated "Cushing's syndrome."

In 1912 he moved to Boston to become professor of surgery at Harvard and surgeon-in-chief to the Peter Bent Brigham Hospital. Here he became a whole-time professor, free from the worries of private competitive practice. But the war was at hand. Cushing joined the B.E.F. as director of a United States base hospital. It was an interlude which did not really advance his surgical career. He has described it in "From a Surgeon's Journal" (1936).

From 1919 to 1933, Cushing worked indefatigably

at his Boston clinic. He was his own neurologist, but in the theatre he developed a high degree of teamwork. He would operate for 3 to 6 hours without lifting his eyes from the operating field, and in spite of an often distinguished gallery all was complete silence. Afterwards, in a tiny dressing-room, he would take tea and toast and jot down notes and drawings. Our portrait, taken by one of his assistants, shows him in this act. Then, voluminous correspondence, dressings, rounds, and a visit to the laboratory filled in the time. Some days he wore his operating uniform until evening. The whole clinic responded to the tireless energy of its chief, and as time went on he delegated less rather than more of his own work.

Cushing left Boston in 1932, at the height of his power. In his last year, he had surpassed anything he had previously achieved, with a mortality of 5 per cent. He went to Yale as Sterling professor of neurology and director of studies on the history of medicine. From here he issued his last and perhaps greatest book on the meningiomas. This, like so much of his work, was written with an assistant, Dr. Louise Eisenhardt.

Of Cushing as a man, Sir D'Arcy Power writes: Cushing had a genius for friendship, saw the best points in everyone and was absolutely innocent of malice, backbiting or evil speaking. He was widely cultivated and enjoyed all that was good in literature, and collected books just as did his master and teacher, Sir William Osler. More especially did he like the writers on anatomy and surgery of the sixteenth and seventeenth centuries, and his collection of Vesalius' works was unrivalled. Full of ideas, he grasped the need for using the talents of every man and introduced the system of visiting surgeons and mutual exchange when he was surgeon-in-chief at the Peter Bent Brigham Hospital. After the war he took temporary charge of some of the surgical wards at St. Bartholomew's Hospital, while a member of the Bart's staff took his place at Boston, and the value of such interchanges soon became apparent.

A SURGEON'S TRIBUTE

Prof. Hugh Cairns writes: Harvey Cushing was probably the greatest surgeon since Lister and his own master, Halsted. When he began his life's work in 1902 brain surgery was still a hazardous enterprise, even in the hands of Horsley and Macewen, and there were not wanting those who said that this ambitious and forceful young man had ruined his career by his choice. Thirty years later, before he retired from active surgery, he was removing nearly two hundred brain tumours a year with very low mortality, and his pupils—and the pupils of his pupils—were scattered far and wide throughout the world. Cushing was the father of modern brain surgery.

The story of his work is to be found in the many papers and monographs that came from his pen in a style that gathered grace as the years rolled by. Writing was not one of his natural gifts, but he followed the precept of Benjamin Jowett that he who would write well should each day read from the great books and commit something to writing. Cushing's advice was, "Always have something on the stocks," and even at No. 46 C.C.S. after a sixteen-hour operating day during the Passchendaele battles, in a cold wet tent in the small hours, he would still sit down to write his diary.

Before he began to practise brain surgery he had already done distinguished work as a general surgeon and as an experimental physiologist, and one of his first contributions was to introduce into operations on the human brain the meticulous technique and exact observation of the laboratory. Like others of his countrymen he saw the importance of teamwork in surgery. The same spirit that had gained him his baseball "letter" at Yale perhaps contributed to the skilful use of his assistants at the operating table. At a time when it was still the fashion to operate "against the clock" he would take from three to ten hours to remove a brain tumour. At first amused, the surgical world was soon convinced by his results. For many years he was the only brain surgeon to publish in full his mortality statistics. He was a beautiful manipulator, and never better than in his last year of active surgery. His showmanship at operation could be superb. He never talked or attended in any way to his visitors and demanded of them the same rigorous deportment that he imposed upon himself. One of the most memorable displays must have been the occasion during the International Physiological Congress in Boston in 1930 when, before Pavlov and other distinguished physiologists, he removed a temporal tumour from an aphasic boy. The operation completed, he removed the drapings and himself applied the dressings, and then demonstrated to an enthralled audience that speech had returned.

One of the secrets of Cushing's success was his method of approach to his subject, a model to all surgeons. In 1900 he had decided to limit himself to what was at that time considered a narrow field of surgery, and he then proceeded to attack it by all the available methods of science. He taught himself the relevant parts of neurology and ophthalmology. For years he did his own experimental work, and to the end of his life he worked in the histological laboratory. He was never too busy to spend an hour or more by himself at the bedside of some patient in whom the diagnosis was obscure, and he followed the after-history of all his cases with a thoroughness that has not been equalled. He would never let a patient die without a tremendous struggle to save him, and afterwards would struggle just as hard to get permission for necropsy. He would himself remove the brain, always insisting on the great value to the surgeon of conducting his own post-mortem examinations. One of his maxims was that "if you want a thing done well you must do it yourself."

No account of his life would be complete that did not note his conspicuous courage as a surgeon. One example of this is from his early days when typhoid fever was rampant in the United States and he and McCrae would go round the wards of Johns Hopkins each night examining the abdomens of all patients in the third week of the disease. One such patient showed symptoms of perforation and Cushing operated but found no perforation. The next night the pain recurred and again there was a negative exploration. On the fourth night there was again sharp onset of pain and Cushing had the courage to open the abdomen for the third time: he found a perforation and closed it successfully.

There can be few men who have driven themselves (and their assistants) so hard. His mind was like a drawn sword. Those who knew him before he got peripheral neuritis in France used to tell the rest of us that we could never hope to realise the dynamic qualities of his prime, notwithstanding the unending tension at which he worked during the post-war period at the Peter Bent Brigham Hospital. The morning began with work on a paper or correspondence, followed by a long operation, each one, it seemed, the most important operation he had ever done. After a meagre lunch of toast and tea of his own making he would spend what seemed to his assistants an unconscionable time doing dressings; then to his office

for consultations and more work on the paper. About 6 p.m. he would go around his wards, and then home for dinner, often with some friend who shared his love of old medical books. The friend dismissed, usually without realising that he had been given his congé, Cushing would work once more at his paper and go early to bed. This routine was broken only for medical meetings, or for an ill patient, and that sometimes meant a whole night at hospital. For him holidays consisted of visits to foreign clinics or congresses. For all its strenuousness his life was unflurried and reflective. Deaf to all distractions from within and without his own world, he built at Boston an Academy for himself and an increasing number of friends who shared his interests in the Old and the New Medicine.

His character was a complex one and a source of endless discussion among his pupils. In hospital and the faculty there are many stories of "the Chief's" ruthless actions, often tinged with impish humour and sometimes followed by swift but fleeting contrition. On one occasion at a dinner which he gave for an illustrious surgical visitor who failed to materialise, he palmed off his house surgeon in disguise upon the Harvard faculty. His apprentices—for such they were—worshipped him even while still smarting under some particularly crushing criticism, and he always contrived to send them away to their own stumbling beginnings in brain surgery with a feeling of confidence, which he found time to reinforce afterwards with long and encouraging letters and with acts of charming generosity. His final visit to this country was when he was given an honorary degree at Oxford, the last of a dazzling array of honours that sat lightly on him. His pupils and friends from many countries in Europe gathered in Oxford for the ceremony. On the Sunday morning he visited the Radcliffe Infirmary, in the footsteps of his hero Osler, and gave a memorable clinic on a variant of basophilism.

Soon after the war he had begun to suffer from intermittent claudication, and eventually had to sink his pride and go to the wards and operating theatre in a wheel chair. In the last years at New Haven his fiery energy was replaced by a mellow equanimity that did not dim his enthusiasms. This gave to the preparation of his monograph on meningiomas a leisured tempo unusual in any work of his. At the time of his death from coronary disease he was engaged on a bibliography of Vesalius.

A NEUROLOGIST'S TRIBUTE

Dr. George Riddoch writes: It has been said that the history of a country is a history of its great men, an aphorism which is true for medical science as for all aspects of knowledge. Such a man may be great because, like Hughlings Jackson, he has discovered fundamental principles whilst another is considered great for his perfection of applied knowledge. Such a man was Harvey Cushing. As Jackson was the founder of modern neurology, Cushing was the founder of modern neuro-surgery. He was, of course, a great technician, based not only on mere manual dexterity but much more on a real knowledge of the reactions of the human subject to disease and of the tissues with which he was dealing. Unlike so many surgeons he was scornful of speed as an index of success, but paid the utmost attention to the avoidance of operative damage, such as hæmorrhage and bruising, and by the training and organisation of his team carefully tending his patients' health throughout his long operations. His method was revolutionary, but was successful, for it was the outcome of a receptive and reflective mind armed with a sound knowledge of physiology and pathology of the nervous system. But his success as a surgeon was as much due to the perfection of his after-care as to the ideal planning of the operation itself. Additional methods of dealing with tumours by radiation were tried and checked on a scientific basis. Further, the interest in his patients never flagged. He followed their course so long as his splendid follow-through system could keep in touch with them.

To say that Cushing was a great technical surgeon in a particularly difficult field of surgery is to indicate only one aspect of his greatness. He was also a first-class clinician, as all his case-records show. In particular, he always appreciated the value of symptoms and in consequence insisted on careful history taking. Like the real clinician that he was he gave full value to his patients' descriptions of their disorders and correlated them with their physical signs. Ever receptive, he noted the unusual and refused to reject as unimportant something he did not understand. His discoveries in clinical neurology, which are at least as great as his development of surgical technique, are due to this open-minded thoroughness and enthusiasm tempered with judgment. Further, he was always sensitive to his patients' mental reactions. In fact, an individual for him had to be viewed as a whole and not merely as a piece of disordered mechanism to be dealt with experimentally by a surgeon biased for his craft. His reaction seemed to those who knew him to be firstly as a careful physician and secondly, as a careful surgeon, if surgery was required. He spared no pains in order to arrive at a correct diagnosis of the disturbance of function, the localisation and nature of the lesion, and whether it could be relieved by operation or other means. In a word, Cushing was a real craftsman in the art and practice of surgery and in his sphere was a master. His thoroughness, breadth of outlook and receptivity were also tempered by intellectual honesty. These qualities have made him an outstanding figure in neurology as well as in neurosurgery. His contributions to neurological literature have on the whole stood and will stand the test of time, not only for their intrinsic value but perhaps even more for their stimulating effect on clinico-pathological research in neurology and neurosurgery. His work has permeated the whole world.

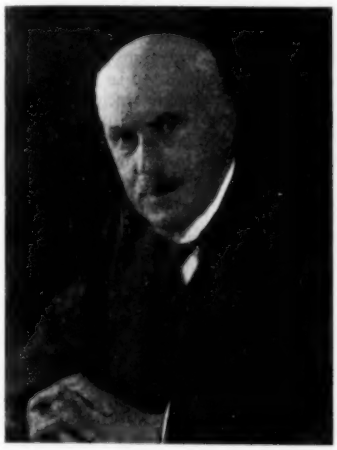
To these gifts—unusual intelligence, receptivity, driving force, enthusiasm, desire for perfection—which he abundantly possessed, must be added others, his charm, his capacity for friendship and, like his friend Osler, who apparently resembled him in many ways, his interest in humanity and his taste for good writing. I well remember the impact of his charming personality when I met him first at dinner at Henry Head's house during the last war, and the effect has remained ever since. In his Clinic at the Peter Bent Brigham Hospital he was a delightful host, unsparing in his efforts to demonstrate things of interest. His patients and staff obviously adored him. Cushing will continue to live in the true Butlerian sense by the impress of his vivid personality on those who came in contact with him as well as by the enduring quality of his work.

". . . The idea that specialization necessarily conduces to narrowness of vision is a matter on which I speak with feeling and assurance, for I gave four years of merry youth to the intensive and extensive study of the egg of a worm under the impression, which has in no wise diminished through the years, that the polychætous annelid in the ocean, as truly as 'the flower in the crannied wall,' is custodian of the eternal mystery."—Prof. ALBERT DAVIS MEAD, *Science*, Sept. 15, 1939, p. 245.

JOHN DIXON COMRIE

M.D., B.SC. EDIN., F.R.C.P.E., F.S.A.

THE death of Dr. J. D. Comrie in Edinburgh on Oct. 1 ends a career of distinction and wide interest. The son of a doctor and an Edinburgh graduate in arts and natural sciences as well as in medicine he served during his earlier years in junior appointments both in Edinburgh and in London at the National and Royal Ophthalmic hospitals. He studied in Virchow's laboratory and from Berlin went on to Obersteiner in Vienna. He joined the staff of Edinburgh Royal Infirmary as assistant physician in 1913, becoming full physician in 1927. In 1909 he was chosen to lecture on the history of medicine, the first appointment of its kind in the university, and he held this post until his death. During the last war Comrie was in charge of wards at the 2nd Scottish General Hospital, president of the recruiting medical board of the Royal Scots area, and lieutenant-colonel in charge of the medical division No. 73 General Hospital, France; he ended as consulting physician to the forces in North Russia. After the war was over he acted as neurologieal specialist to the Scottish special pensions board. He was for long associated with the British Medical Association and there were few of its committees in Scotland on which he did not at one time serve. He had a flair for organisation and served on the central council. In 1930 at Winnipeg he presided over the section of medical history and sociology. In 1935 he became a member of the senatus of Edinburgh University, and in 1939 chairman of the honorary staff of the Royal Infirmary.



Elliott & Fry.

Dr. Comrie wrote widely on medical subjects, maintaining always a catholic outlook on medicine and deprecating excessive specialisation. He took responsibility for Black's Medical Dictionary and Black's Medical Advisor, and his book, "Diet in Health and Sickness," became justly popular. In 1912 he inaugurated the Edinburgh series of Medical Textbooks, many of which have had a successful career. Last year he became editor of the *Edinburgh Medical Journal*. But his name is chiefly associated with the study and record of medical history, where he had scope for scholarship and literary ability; his book on the History of Scottish Medicine has remained a classic. He also contributed a number of short papers to the Edinburgh Medico-Chirurgical Society on the history of the Edinburgh medical school.

All this was in addition to his work as consulting physician, as physician to the infirmary and as a successful teacher of clinical medicine. He was liked by the students for his clear exposition and fundamental bedside teaching, and especially for his kindly spirit and unruffled calm. It was the rarest thing for him to be angry; the nearest approach which an observer could see was an undue quietness. He had to labour against odds. At one time a tuberculous lesion of the right wrist forced him to obtain leave of absence, and while he made an excellent recovery the deformity limited the use of his right hand, and he learned to write with the other. During the last six months when his health was failing he continued with his duties until the August vacation; and from his bed he kept in touch with the affairs of the Edinburgh medical world. His cheerful presence will be missed by colleagues, juniors, students and patients alike.

Dr. Comrie married Margaret Christian, eldest daughter of Archibald Hewat, F.F.A. They had three daughters.

CHARLES COTTON

O.B.E., M.R.C.S., F.R.C.P.E.

Dr. Cotton, who died at Canterbury on Sept. 30 at the age of 83, was honorary librarian of Christchurch Cathedral and had spent the latter half of his life in recalling the history of Saxon saints buried in the cathedral and of the Grey Friars who guarded it. Born at Twickenham in 1856, the son of Hugh Powell Cotton of Torquay, a Treasury official, he was educated at Western Grammar School and King's College School, London, going on to St. George's Hospital from which he qualified in 1879. Before settling in Thanet he spent some time at Edinburgh where he took his fellowship and as a ship's surgeon on the African Royal Mail route. In Ramsgate he held many hospital appointments and was active in ambulance work, becoming commissioner of the St. John brigade for the three counties. In the war of 1914–18 he served with 13 auxiliary hospitals. Early in his career he wrote a book on the history and antiquities of St. Lawrence, Thanet, and writing occupied more and more of his time, his most extensive work being a survey of the properties held in Kent by the Order of St. John throughout the ages. Dr. Cotton married Adelaide, daughter of Major-General R. T. Leigh, herself a Lady of Grace of the Order of St. John. They had one son.

Medical Diary

ROYAL SOCIETY OF MEDICINE, 1, WIMPOLE STREET, W.1.

TUESDAY.—2.30 P.M., general meeting of fellows.

FRIDAY.—2.30 P.M., Dr. A. E. Barclay: Radiology in the War Emergency Services. Major D. B. McGrigor will also speak.

ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE, 26, PORTLAND PLACE, W.1.

THURSDAY.—4.30 P.M., Sir Rickard Christophers, F.R.S.: Malaria in War. (Presidential address.)

ROYAL INSTITUTE OF PUBLIC HEALTH AND HYGIENE, 28, PORTLAND PLACE, W.1.

MONDAY.—3 P.M., Sir John Orr, F.R.S.: Dietary Standards.

TUESDAY.—3 P.M., Sir John Orr: Assessment of State of Nutrition.

WEDNESDAY.—3 P.M., Sir John Orr: The Public Health, Agricultural and Economic Aspects of the Nutrition Problem. (Harben lectures.)

TAVISTOCK CLINIC, WESTFIELD COLLEGE, 8, KIDDERPORE AVENUE, N.W.3.

MONDAY.—2.30 P.M., Dr. G. W. B. James: Disorders most frequently met with—Fatigue, Hysterics, Unconscious States, etc. 3.30 P.M., Dr. H. V. Dicks: Mental Mechanisms.

WEDNESDAY.—2.30 P.M., Dr. Dicks: Fear and Anxiety States. 3.30 P.M., Dr. Dicks: Conversion Hysteria.

FRIDAY.—2.30 P.M., Dr. P. L. Backus: The use of Drugs in Emergency Cases; and Dr. J. R. Rees: Psychological Treatment—Persuasion, Relaxation, Suggestion. 3.30 P.M. Dr. J. A. Hadfield: Treatment, Hypnoanalysis, Suggestion, Abreaction, Deep Analysis.

PARLIAMENTARY INTELLIGENCE

ON THE FLOOR OF THE HOUSE

By MEDICUS, M.P.

THE Budget debates have ranged over a very wide field. They have included speculations as to whether the capitalist system can survive a long war by such Conservatives as Robert Boothby and Sir Arnold Wilson. And they have included calculations on how much money can be raised by a tax on capital assets at the end of the war. Both points of view cannot be true. Mr. Boothby also stressed a point of especial interest to the professional classes when he said that he wished it had been possible for the Chancellor to have given warning of the progressively increased taxation of individuals. The lawyers, barristers and doctors who have been making substantial incomes in the past financial year and are now brought down to incomes of a half or quarter or a less proportion in this financial year are very hard hit by the 7*s.* (and later 7*s.* 6*d.*) scale of income-tax. The Chancellor intervened on this to say: "I am so conscious of cases of the sort that he has quoted . . ." that instead of his being called on to pay in respect of the thousands earned in past years "he would be entitled to substitute his actual earnings of this year. That is an enormous alleviation." It may be well to remember this debate on Oct. 2 (column 1702 in Hansard) for future reference.

* * *

The Budget was called a sumptuary budget, but it is more than that; it is an anchorite's budget and with it we go back not only to old war taxes but for some curious reason to old war tunes and old sentiments. The Budget and other emergency measures is, however, only a background against which the changing scene of Europe develops and unfolds. The Prime Minister's story last week was of the meetings in Moscow of Nazis and Communists on Sept. 26 and the announcement of the new, the fourth, partition of Poland and the endeavour to saddle Great Britain and France with responsibility for the continuance of the war unless they accepted what Berlin wants to be a fait accompli. The economic agreement between Germany and Russia is more impressive in theory on paper than in fact, for how can Germany supply manufactured goods—especially machinery—to Russia when she cannot supply herself? And how can Russia transport oil from the Baku fields, iron from Siberia and coal from the Donetz to Germany over the long railway stretches and across ravaged Poland? What Russia can give Germany on the Baltic, notably timber, Russia can deliver easily. Since last week the situation has developed by Hitler's peace offer to which he was first willing to await an answer in a week, then it became a fortnight, and it may become a longer period if any neutral will lend a hand. But Mussolini, who presumably knows Hitler's mind better than most people, has refused to act up to the present and President Roosevelt shows no eagerness to act as a dictator's messenger.

Hitler's vague fulminations about his "new weapon" which cannot be used against Germany has produced very little effect up to the present. But it is worth recalling that in the last war the Germans were convinced that their blue cross gas, that is the noxious smokes which are particulate clouds, would penetrate British respirators, force their removal and lay thousands of British soldiers open to poisoning by phosgene. Unfortunately for this calculation from the German point of view the British respirator gave a very considerable degree of protection against noxious smokes and the colossal expenditure of the Germans on blue cross shells was largely wasted.

During last week's war debate Mr. Lloyd George took a line urging careful consideration of any peace approaches; he managed so to antagonise the House that such Conservatives as Mr. Duff Cooper and such Labourites as Mr. David Grenfell united in condemnation. Mr. Lloyd George winced and flushed at Mr. Grenfell's (a fellow Welshman) rebuke, but protested loudly to Mr. Duff Cooper that he was "the last man to propose that we should agree to a surrender."

* * *

The peace offensive of Hitler has, however, fallen very flat. The Prime Minister has agreed in a spirit of calm reasonableness to consider any peace proposals on their merits. But the protagonists of a Hitler peace in this country have secured little support. The Labour, Liberal and Conservative parties are all of them united in their own ranks against any further Munich truces which are merely the prelude to further slaughter. The only party which refuses this support is the I.L.P. of 3, who represent a part of Glasgow and who are contesting an election. Their voice—and voices of a few partly echoing theirs—was heard in the House, but to no serious effect.

Parliamentary procedure is now getting back to a fairly normal level. We have had a division for and against the sugar duty and for and against other points. And in the background a new all-party body of members has constituted itself in order to have full, free and non-party discussion on vital matters of the day. The Whips may not like it. But with divisions few and far between and with national unity between Labour and Conservative so strongly expressed on all major issues the power of the Whips declines. Will new party divisions arise? Probably not in name—names may remain, but the content indicated by that name may be very different in 2 or 3 years' time from what it is now.

FROM THE PRESS GALLERY

Sugar

IN the House of Commons on Oct. 4, when the clause of the Finance (No. 2) Bill increasing the tax on sugar was being discussed, Mr. CHARLES BROWN said that it seemed to be adding insult to injury to ask very poor people to pay a penny or twopence a week more when after a lifetime of hard work the social system under which they lived had condemned them to poverty.—Mr. GRAHAM WHITE said that the House would have accepted this further impost cheerfully if they could have been given some hope that something would be done to relieve the burden on old-age pensioners.

Sir FRANCIS FREMANTLE asked what was the hardship if people had to cut off sugar and find some substitute? In a pamphlet he had received that morning from the Food Education Society it was pointed out that in the days of Queen Elizabeth there was no such thing as sugar as we knew it today. Until the beginning of the last century sugar was not, and could not be, a regular article of the diet of the people and they had to use other materials. Sugar was obviously useful from the point of view of nutrition, but it was not absolutely essential. According to the pamphlet to which he had referred honey would be more useful for those who were to perform feats of endurance. Old-age pensioners could buy instead of

sugar an equivalent amount of cereals and other articles which were constantly being recommended by the Food Council. People were being asked to give up an amenity and not an essential of nutrition.—Dr. EDITH SUMMERSKILL said that she had no intention of participating in this debate until she heard her medical colleague putting forward arguments which had no scientific basis whatever. It shocked her to hear a medical man advancing such ridiculous arguments. Recently the hon. member had suggested in the House that sugar caused a certain amount of dental caries. Her dentist disagreed with that view and suggested that it was the acid-forming substances in the mouth which caused dental caries. What Sir Francis Fremantle should have told the House was that sugar was one of the cheapest foods which was enjoyed by the workers. Sugar was a carbohydrate which provided warmth and energy for those people who could not afford the more expensive foods.

Captain CROOKSHANK, financial secretary to the Treasury, said that there was no argument about the heaviness of the burden that the Chancellor was laying on the country, and particularly on those who were on lower standards of wages and pensions; but in view of the enormously difficult situation and the fact that the Government must raise these large sums, he hoped that hon. members would be content with making their protest.

QUESTION TIME

OCT. 4–5

Students and Military Service

Sir CHARLES CAYZER asked the Secretary of State for War whether he could give an official ruling as to the precise age at which young men who were now students or would be taking their examinations in the near future for any of the learned and technical professions would be called up for military service in view of the difficulty of these young men settling down to serious studies if they had no definite idea whether or not they would be able to take their examinations.—Mr. ERNEST BROWN replied: Students who on Oct. 1 had reached the age of 20 and had not reached the age of 22 are liable to be called up for service under the National Service (Armed Forces) Act. Those who registered as militiamen last June are likely to be called up during the next six weeks, but it is not anticipated that any of those registering on Oct. 21 next will be called up before the middle of November. The general postponement of training granted under the Military Training Act to full-time students has been cancelled, but individual students can apply to the hardship committees for postponement of their liability to be called up for service, on the ground of exceptional hardship. In any case when application for postponement has been duly made, the man concerned will not be called up while his application is awaiting decision. I should add as regards the age limit that it may be anticipated that it will be raised later on by proclamation.

Medical Press and Ministry of Information

Sir FRANCIS FREMANTLE asked the Parliamentary Secretary to the Ministry of Information if he had on his staff persons connected with the technical, and especially the medical press, who would be able to prevent distorted or exaggerated reports of disease or other calamity, actual or possible, either in this country or in the theatre of war.—Sir EDWARD GRIGG replied: No special provision has been made in the staffing of the Ministry to provide against the emergency which my hon. friend contemplates. The subject is one for my right hon. friend the Minister of Health, who will now again be directly responsible for all the publicity necessitated by the work of his department.

Sir F. FREMANTLE: Does my hon. friend realise the very great danger of these exaggerated reports and the essential importance of any such suggestions being sifted before they are given out to the public?—Sir E. GRIGG: Perhaps my hon. friend will address that suggestion to the appropriate department.

Price of Drugs

Mr. DAVID ADAMS asked the President of the Board of Trade whether he was aware that since the outbreak of war vegetable drugs, essential oils, and medicinal chemicals had doubled and even trebled in price, and that certain of these were being withheld altogether from the market; and if, in view of war and civilian requirements, he proposed to control essential supplies of these vital commodities.—Mr. OLIVER STANLEY replied: I find that there have been substantial increases in the price of a number of goods of this class. Inquiries are being actively pursued and discussions have been arranged with representatives of the wholesale and retail drug trades. I am not in a position to make any further statement at the moment.

Cost of Evacuation

Mr. WOODS asked the Minister of Health whether he could give an estimate of the following costs: the initial cost and the subsequent weekly cost to the Government of the evacuation scheme: the initial costs and the subsequent weekly cost to local authorities in reception areas in respect of expanded education and social services; and the weekly cost being met by local authorities in evacuated areas in respect of maintenance and interest charges on capital equipments not now in use.—Mr. ELLIOT replied: It is estimated that the initial cost to the Government of the evacuation scheme, including the provision for preparatory measures in the supplementary estimates for England and Wales and Scotland of July 14, 1939, and the probable cost of transport will be in the neighbourhood of £2,000,000. The weekly expenditure on billeting is approximately £450,000. No information is available at present upon which to base an estimate of the costs of expanded services in reception areas, or the expenditure in evacuated areas in respect of capital equipments not fully used which may result from the evacuation scheme.

Inspection of Evacuees

Sir CHARLES CAYZER asked whether, in view of the fact that 35,000 more evacuated children were to be sent to the country, he would ensure that in every case medical inspection would be carried out before they left town, with the object of avoiding criticisms which had been made against previous evacuees in different districts.—Mr. ELLIOT replied: Yes, Sir. I have instructed evacuating local authorities before dispatching any further parties to the reception areas to carry out a medical inspection and, where necessary, the efficient treatment of all children to be included in the parties.

Release of Full-time Members of E.M.S.

Sir FRANCIS FREMANTLE asked whether he would arrange for medical practitioners, now engaged for duty in hospitals at present wholly or partially empty, to be released for civil practice with liability to immediate recall in case of need.—Mr. ELLIOT replied: Letters have been sent to a number of whole-time members of the Emergency Medical Service offering to release them for civil practice under certain conditions.

Doctors at First-aid Posts

Sir FRANCIS FREMANTLE asked the Minister if his attention had been drawn to the absence of arrangements for the continuous medical supervision of first-aid posts and for the continued training of the first-aid parties attached to such posts; and what action he proposed to take in the matter.—Mr. ELLIOT replied: Arrangements were made before the outbreak of war whereby a medical officer attached to each first-aid post undertook for an annual fee to conduct the collective training of the personnel of the post, under the general supervision of the medical officer of health. These arrangements are still in operation.

Sir F. FREMANTLE: Does my right hon. friend realise that while what was required in peace-time represented a very small amount of work that what is now required calls for an infinitely greater amount of work, and that medical officers cannot possibly attend without further

remuneration?—Mr. ELLIOT: Later this week I am receiving some doctors who took part in the organisation of first-aid posts and I should prefer not to say anything further on the subject at present.

Mr. SORENSEN: May I ask whether the inference to be drawn from this is that these doctors are not willing to help the State unless they are paid for it?

Medical News

University of Cambridge

At recent examinations the following were successful:

D.M.R.E.

Part II—E. H. Allen, R. B. Boal, A. H. Brockbank, O. C. Levine, H. M. Marks, M. P. G. O'Brien, S. Russell Reynolds, and K. V. Shetty.

St. Andrews University

On Oct. 5 the honorary degree of doctor of laws was conferred upon Dr. W. G. Campbell, lecturer in orthodontics in the university.

Royal Faculty of Physicians and Surgeons of Glasgow

At a meeting of the faculty held on Oct. 2, with Dr. John Henderson, the president, in the chair, the following were admitted to the fellowship: Anne Cunningham Aitkenhead, M.B. (Glasgow); and David Clowes Williams, M.B. (Nottingham).

St. John's Hospital for Diseases of the Skin, London

The outpatient department of this hospital is now open daily from Monday to Friday from 1.30 to 3.30 P.M.

Medical Society of Individual Psychology

There will be no meeting of this society this month. Arrangements for further meetings will be circulated to members as soon as possible.

British Institute of Radiology

A meeting of this institute will be held at 32, Welbeck Street, London, W.1, on Thursday, Oct. 19, at 4 P.M., when Major McGrigor, M.B., will be installed as president for the new session.

Tavistock Clinic

Six lectures on the diagnosis and treatment of war neuroses will be given by members of the staff of this clinic at Westfield College, 8, Kidderpore Avenue, London, N.W.3, on Oct. 16, 18, and 20. Further particulars may be had from the educational secretary of the clinic. The subjects of the lectures will be found in our medical diary.

West End Hospital for Nervous Diseases, London

The outpatient department of this hospital, at 73, Welbeck Street, W.1, is open daily at 2 P.M. except on Saturdays. The inpatient department at Regents Park has been reopened to half of its peace-time capacity.

Dr. W. Allen Daley has been recommended by the Emergency Committee to succeed Sir Frederick Menzies as medical officer of health to the London County Council.

Dr. P. S. Selwyn-Clark, director of medical services at Hong-Kong, has been appointed a member of the executive council of the colony.

Vacancies

Bedfordshire County Council.—Asst. M.O.H. Maternity and Child Welfare, £500.
Brighton, Sussex Eye Hospital, Eastern Road.—H.S. at rate of £150.
Brighton, Sussex Maternity and Women's Hosp.—Res. H.S., £130.
Burnley County Borough.—Asst. M.O., £850.
Coventry, Coventry and Warwickshire Hospital.—H.S.'s and H.P.'s to Special Depts., each at rate of £150.
Dorset, Milton Abbey Nursing Home.—Temp. Res. M.O.
Dublin Royal City Hospital.—Radiotherapist for Deep X-Ray Dept.
Glasgow Eye Infirmary.—Res. H.S., £150.
Huddersfield County Borough.—Assist. M.O.H. £500.
London County Council.—Coroner for the County of London, £1700.
Manchester, Booth Hall Hospital for Children.—Asst. M.O. at rate of £200.
Nottingham General Hospital.—H.S. for Orthopædic and Fracture Dept., at rate of £150.
Reading, Royal Berkshire Hospital.—Surg. Reg.
Rochdale County Borough.—Res. M.O., £350.
Sheffield Children's Hospital.—H.S., at rate of £100.
Stoke-on-Trent, North Staffordshire Royal Infirmary.—Hon. radiologist.
Stoke-on-Trent, North Staffordshire Royal Infirmary.—2 H.S.'s, to Spec. Dept., each at rate of £150.
Swansea General and Eye Hospital.—H.P. at rate of £150.
Wigan, Royal Albert Edward Infirmary.—H.S. at rate of £150.
Wolverhampton, New Cross Hospital and Institution.—Asst. (Deputy) M.O., £350.
Wolverhampton Royal Hospital.—Res. Anæsthetist at rate of £200.
The Chief Inspector of Factories announces a vacancy for an examining surgeon at Manningtree, Essex.

Births, Marriages and Deaths

BIRTHS

CARSON.—On Oct. 7, the wife of Dr. D. M. Carson, of Nottingham—a daughter.
CLARK.—On Sept. 11, at Naunghla Hospital, Burma, to Josephine, wife of Dr. Roger H. P. Clark, medical officer, Burmah Oil Company—a son.
KEMPTON.—On Oct. 3, at Wokingham, the wife of Lieutenant J. J. Kempton, R.A.M.C.—a daughter.
KLABER.—On Oct. 5, at Bishop's Stortford, Herts, the wife of Dr. Robert Klaber—a son.
SLADEN.—On Oct. 2, at Wheathampstead, Herts, the wife of Dr. F. J. Sladen—a daughter.
TOLAND.—On Oct. 6, at Hammersmith Hospital, the wife of Dr. C. P. K. Toland, of Dover—a son.

MARRIAGES

KEIGHLEY—BURCH.—On Sept. 30, in Leeds, Captain Robert Keighley, of Darlington, to Jacqueline Vyvienne Burch, M.R.C.S., of Clemsfold, Sussex.
LAVELLE—BROCK.—On Oct. 3, at Hampstead, John Lavelle, M.B., of Shrewsbury, to Marjorie Brock, of Hampstead.
NEWTH—DAVIS.—On Oct. 7, Alfred Arthur Edmund Newth, M.B., to Gwendolyn Glendinning Davis, M.B., both of Nottingham.
RANSOME—ABNEY.—On Oct. 3, at St. Michael's, Chester Square, A. S. Ransome, M.B., to Janet Abney.
SMYTH—ROSS.—On Oct. 6, at Epsom, Edward Smyth, M.B., to Ursula Ross.
YOUNG—LEWRY.—On Sept. 18, in London, Carmichael Aretas Young, M.B., of Adelaide, South Australia, to Marie Lewry, of Botley, Hants.

DEATHS

ELLIS.—On Oct. 3, at Crowborough, Henry Augustus Ellis, M.B. Dubl., late assistant physician to Margaret Street Hospital, aged 78.
SCORESBY-JACKSON.—On Sept. 29, in Worthing, Margaret Scoresby-Jackson, M.D. Durh., elder daughter of the late R. E. Scoresby-Jackson, M.D.
WHITESTONE.—On Oct. 7, at Hollingbourne, Augustus Mayberry Whitestone, M.B. Dubl., aged 82.

Appointments

COATES, HARRY, M.R.C.S., second assistant medical officer at the Notts County Mental Hospital, Radcliffe-on-Trent.
LYNCH, G. A. CARY, M.D. Lpool, D.P.H., pathologist and bacteriologist to the Royal Albert Edward Infirmary, Wigan.
PETERS, H. J., M.B., B.Hy. Durh., D.P.H., medical officer of health for Leigh.
Medical Referee under the Workmen's Compensation Act, 1925: Dr. T. E. GUMPERT, for the county-court district of Barnsley (circuit No. 13).

Colonial Medical Service.—The following appointments and promotions are announced:—

BRODERICK, G. L., M.B. Camb., medical officer, Uganda;
BURFIELD, G. A., M.B. Camb., medical officer, Northern Rhodesia;
CROCKET, J. A., M.B. Glasg., medical officer, Gold Coast;
HACKETT, E. W. R., M.B. Dubl., medical officer, Hong Kong;
HEISCH, R. B., M.B. Camb., medical officer, Kenya;
HOWELLS, W. M., M.B. Glasg., D.P.H., deputy director of medical services, Gold Coast;
LOCKHART, F.R., M.B. Manc., senior medical officer, Kenya;
MULLEN, W., M.B., medical officer, West Africa;
PATERSON, F. S., M.B. Edin., D.T.M., senior medical officer, Sierra Leone;
SKAN, D. A., M.R.C.S., D.T.M., pathologist, Nyasaland;
TUCKER, W. A. L., L.R.C.P.E., medical officer, Uganda;
WILSON, H. T. H., M.R.C.S., medical officer, Tanganyika Territory.

NOTES, COMMENTS AND ABSTRACTS

BOMBS AND RADIUM

A MEMORANDUM on the dangers of the dispersal of radium by air bombardment has been circulated by the National Radium Commission to all known holders of radium. Its author, Mr. A. R. Greatbatch, B.Sc., of the research department, Woolwich, first examines the effects of a bomb explosion in general terms and then applies them to the particular case of radium. He differentiates between the effect of blast and of fragmentation. Blast effect is caused by the extraordinarily high speed of the explosion and the succeeding pressure wave. In the case of a 500-lb. bomb—a size which may be expected to be used by enemy aircraft—any object within a range of 20–25 ft. would be subjected to extremely high stresses. Large objects, unless exceedingly strong, would be shattered and smaller objects, if suitably placed, might be hurled away with a velocity approaching that of a bullet leaving the muzzle of a rifle. Glass containers within this range would undoubtedly be completely dispersed, and unprotected metal radium needles would almost certainly be disrupted and the contents scattered. Any body or envelope surrounding a needle would afford it some protection, and it is even conceivable that a needle buried in a human torso would escape destruction under some circumstances. Generally speaking, the stronger the envelope the greater the protection, and a reasonably large measure of protection would be given by a suitably designed steel container which unless made of special bullet-resisting steel would require to have walls at least 3 in. thick.

The danger from fragmentation is of a different nature. Here there is a possibility that a radium container may be struck by one of the many thousand bomb fragments which are hurled by the force of the explosion at velocities reaching double or even treble the muzzle velocity of a bullet. The danger range may extend to over 100 ft. from the bomb, and a direct hit by a fragment within this area would shatter a container unless heavily protected in the manner described.

The protective value of the building which houses the radium should not be overlooked nor overrated. Modern armour-piercing bombs dropped from a height of 10,000 ft. or more are capable of penetrating about 5 ft. of concrete or 30 ft. of earth. Thus to attain complete protection from both the blast and fragmentation of a 500-lb. H.E. armour-piercing bomb, the radium should be covered by well over 30 ft. of earth. The sinking of radium to a depth of 50 ft. in the ground will therefore make it safe from dispersal in all circumstances, including a direct hit. Similar safety might be attained by heavy concrete buildings of the requisite thickness, but the cost would be very high.

LEPTOSPIROSIS

THE mud-fever[1] or harvest-fever of Germany and Hungary, which is caused by *Leptospira grippotyphosa*, probably carried by field-mice, and is identical with the swamp-fever or water-fever of Russia, has its counterpart in a fever contracted by workers in the wet rice-fields of Vercilli, Italy, where the diagnosis is complicated by the concomitant presence of Weil's disease, due to *L. icterohæmorrhagiæ*. At Vercelli Prof. Prospero Mino[2] isolated from the patients and from the local rats a distinct type of leptospira, which he named *L. mitis*; but he has since found that it is identical with *L. bataviæ*, first described in the Dutch Indies in 1926. The clinical picture is of two varieties. The typical symptoms are initial malaise and headache followed by fever, crural and lumbar myalgia, and intense injection of the conjunctivæ; the spleen is constantly enlarged, and often there are labial herpes and a transitory morbilliform eruption; albuminuria is usually slight, but urobilinuria is almost always found. In a few cases a slight subicteric tinge affects the sclerotics, but there is no true jaundice. In one case only was the cerebrospinal fluid under slightly increased pressure. The other type of illness was gastro-enteric, without splenic enlargement, headache, and myalgia, but with nausea, vomiting, epigastric and other abdominal pains, and diarrhœa. Of 80 cases of illness among workers in the rice-fields in July–August, 1938, 56 were due to one or other of the two forms of leptospirosis, 26 giving the typical picture and 30 the gastro-enteric type. The serum of the great majority of these patients agglutinated only *L. bataviæ*; in fact only 6 agglutinated *L. icterohæmorrhagiæ*. Of a further 22 cases of leptospirosis seen in the autumn, when the rice was cropped, 5 were due to *L. icterohæmorrhagiæ* (2 without jaundice), 16 to *L. bataviæ*, and 1 to *L. hebdomadis* (the cause of seven-day fever).

The differentiation of *L. bataviæ* in Italy rests on the clinical picture and agglutinations. No morphological difference has been discovered between these two forms of leptospira. Mino points out that many fevers in different parts of the world are assigned to various kinds of leptospira on the results of agglutination, but that the agglutinability both of pathogenic and non-pathogenic forms of leptospira can be altered by experimental passage through animals.

1. *Lancet*, July 29, 1939, p. 279, and Sept. 2, 1939, p. 569.
2. Mino, P. *Policlinico* (sez. med.), Aug. 1, 1939, p. 410.

PSYCHOLOGY FOR YOUNG PEOPLE

IN these days, when simple biology and physiology are part of the education of every child, it seems equally important for the child to be taught the elements of psychology. A knowledge of the processes of the mind may well help to prevent the development of a psycho-neurosis later in life. But although there can be little doubt about the advantages of psychological training for the young, many of those who have attempted it have despaired of finding a method simple enough for the child to understand. Mr. Victor Chamberlain, in "How You Grow Up" (London: Gerald Howe. 1939. Pp. 121. 2*s*. 6*d*.), either has too scientific a knowledge of psychology for the task or has been unable to enter into the child mind. Whatever may be the cause, he cannot be said to have succeeded in his aim. The right book on this subject is worth writing, and Mr. Chamberlain should try again.

SPANISH PSYCHOLOGICAL STUDIES

FURTHER psychological analyses of the political opponents of nationalist Spain have been published by A. V. Nágera, whose earlier findings in different classes of prisoners were mentioned in these columns (1939, **1**, 68). With E. M. Martínez he studied 50 Spanish women who had been imprisoned for serious offences committed during the "red terror" at Malaga, and the conclusion is reached that the extreme cruelty women may show when social inhibitions are relaxed is to be explained as vengeance against the males who dominate them (*Sem. med. española*, Sept. 2, 1939, p. 194). More interesting to us in this country, however, is the study that Nágera made with E. C. Gargollo and M. A. Fernández Rivera on 41 Englishmen taken prisoners while fighting for the republicans (*Ibid*, Sept. 16, p. 308). These men, it is said, took a much more active part in the actual fighting than did the North American prisoners, to judge by the large number of wounded. The results in this group are very different from those n the other groups already reported. To begin with, 12 of the men were adjudged mentally deficient—a very high proportion—but the remainder had average intelligence, in contrast to the other groups, in which intelligence was generally low. In their reasons for fighting for the republicans they appeared to be much more idealistic, and their Marxist tendencies did not

seem to be related to their economic situation. Social and professional failures, however, were common, and atheism and indifference towards religion were more conspicuous. There were only 8 alcoholics among them, and 16 of the remaining 33 were teetotallers. There was much less sexual libertinage among the English, and their first experiences with women as a rule dated after the age of twenty. This led the investigators to look for evidence of homosexuality, but they found none.

WAR UNIFORMS FOR NURSES

A NEW war uniform for nurses working under the British Red Cross and Order of St. John is certainly pleasant to look at. It consists of a one-piece dress in navy blue gingham, fadeless and shrunk, 60 in. round the hem and 12 in. off the ground. There is a detachable collar of white cambric and detachable cuffs of the same material, and a shoulder cape of the blue gingham. The apron has no cross pieces at the back; instead, the top clips into slots in the front of the dress. This makes it easy to put on. It is long enough to reach the end of the dress hem and is wide enough to cover it all round. Light grey stockings will be worn with black laced shoes which have leather cuban heels. A navy blue felt sailor hat with a ribbon band of red and black with a touch of white is for out of doors, when a double-breasted overcoat in navy serge with an all-round belt will also be worn. The cap to be worn in the wards is of organdie.

One cannot help wondering if this is really the most practical get-up for the war-time nurse. What will be the state of those muslin cuffs after the first rolling-up of the sleeves? The cape will certainly restrict shoulder movements, and old war nurses will remember perpetually tossing the points over the shoulders, and even pinning them there. The cap, though smaller than that used in the last war, is still big enough to dip into the antiseptics on the trolley when the nurse bends down to the bottom shelf.

DOUBLE-DECKER HAND AMBULANCE

THOSE who have the responsibility of arranging for the transport of wounded, whether in our own cities or abroad, will be interested to see the traction carriage which Major Harold Furber is demonstrating at Albion House, 59, New Oxford Street, London, W.C.1. Each carriage, he says, can carry two stretcher-cases and can be easily manipulated by one person once it is loaded. The steel frame of the carriage looks rather like a workmanlike dinner-trolley. One patient lies as "bottom layer" on a canvas hammock which is lashed on to the frame, while the second patient is placed on a detachable stretcher which is lifted to clip into position and form the top layer. The carriage is balanced on a central axle fitted with two motor-car wheels, and when it is standing a smaller wheel on a rod is let down at each end to steady it. At the end of the last war, it is stated, some 2000 of these carriages were in use. They might prove specially convenient for the handling of air-raid casualties in towns, when a great strain may be thrown on volunteer stretcherbearers, and the carriage could easily be pushed by one man along smooth streets.

RABBITS IN WAR-TIME

To the farmer it must sometimes seem that he shares his land with the rabbits, but in time of war it is essential that the farmer shall get even more than his fair share, and this usually means severe rabbit-repression. Popular methods of catching rabbits for marketing are cruel, while the most effective methods of destroying them in bulk as a pest are humane. The Universities Federation for Animal Welfare (UFAW) has therefore sided with the agricultural bodies who consider the destruction of rabbits is more important than catching them for market, and UFAW sponsored the Prevention of Damage by Rabbits Act, 1939, which lays the onus of keeping down rabbits on the occupiers of land. Captain C. W. Hume, the honorary secretary of UFAW, has now compiled a third edition[1] of the federation's "instructions for dealing with rabbits" which contains the text of the new act. Captain Hume considers fumigation of the burrows with cyanide is the most humane method of destruction. He states that the carcases of rabbits killed in this way are not poisonous and have been eaten by human beings without harm. As the rabbits have to be dug out it is however not an appropriate method for obtaining rabbits for sale, and if food becomes scarce this may well be a serious disadvantage. Other approved methods of destruction are fumigation with motor-car exhaust gas, the long net, dazzle light and dog, ferrets, shooting, catching in enclosures, and humane snares. The need for simultaneous action among neighbours is needed if the destruction is to be really effective.

ALCOHOLISM IN BOSTON, MASS.

DETAILED statistics on alcoholism are rare, and the series of papers from the Boston City Hospital, published in the *New England Journal of Medicine* for July 13, form a valuable contribution to precise knowledge. Of 304,740 patients treated at the hospital during the ten years 1927–37, 10,286 were suffering from alcoholism. Almost twice as many of these were inpatients as outpatients; the average length of stay was one day; and the daily cost was over £1 per patient. This money is not considered to be profitably spent, for the treatment is merely superficial. The ratio of men to women was 18 to 1, and in a series of 344 cases of delirium tremens admitted to the Haymarket Square relief station the sex-ratio was about the same; most of the patients were between thirty and fifty and unmarried. Of the foreign-born group the largest number were born in Ireland; the great majority were unskilled or manual labourers. The condition of 174 of the series was not improved on discharge. The bulk of these patients had medical and surgical complications, of which the commonest were pneumonia and fractures. Nearly all alcoholic hospital patients are injured in some way, chiefly in the head, but of over 16,000 cases only 75 were fatal.

The authors urge that any plan for the treatment of alcoholism which does not give due weight to prevention is fundamentally unsound. The present method of routine care has failed to lower the incidence and cost. The outstanding need in Boston, they say, is not for more facilities for such patients; it is rather for means whereby the alcoholic patient can be studied as an individual, the possibility of his reclamation evaluated, and psychiatric treatment made available when it seems worth while.

CARBON DIOXIDE AS A VASODILATOR

THE local injection of carbon-dioxide gas to dilate the vessels in conditions such as Raynaud's disease has often been advocated, and J. C. Mom (*Ned. Tijdschr. Geneesk*, 1939, **83**, 3597) now describes the technique he uses and the results in some of his cases. A 100 c.cm. syringe is filled from a gas-bag with carbon dioxide and connected with an ordinary hypodermic needle; a manometer can be interposed if desired. The gas is injected slowly into the subcutaneous tissues at different points on the arm or leg, 40–50 c.cm. being introduced through each puncture. A total of 300–400 c.cm. can be given in this way. Care must be taken to avoid introducing the needle into a vein. Mom has not met with any complications except occasional faintness, which he thought to be emotional in origin, during the injections. The introduction of the gas causes only momentary local discomfort and is almost immediately followed by flushing of the skin and a subjective sensation of warmth in the limb. Mom reports rapid and considerable relief in a number of cases, even in one case of Buerger's disease with gangrene of two toes, where the patient was able to return to work as a road-maker after a course of injections.

1. Obtainable from UFAW, 29, Gordon Square, London, W.C.1. Pp. 20. 3*d*.